

# CURRICULUM VITAE

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PROF CLAUDIO SANTI



- ACADEMIC CURRICULUM VITAE**
- LIST OF PUBLICATIONS**
- LIST OF SELECTED INVITATED TALKS**
- LIST OF PROJECT SUPPORTED BY THIRD-PARTY FUNDS**
- ACADEMIC TEACHING & LIST OF SUPERVISED PHD THESIS**



<b>ACADEMIC CV</b>	
<b>Personal Data</b>	
<b>Name</b>	<b>Claudio Santi</b>
<b>Address</b>	Dept. Pharmaceutical Sciences University of Perugia – Via del Liceo 1 Perugia 06164 ITA
<b>Phone</b>	+39 075 5855102 (office) +39 3489515617 (mobile)
<b>e-Mail</b>	claudio.santi@unipg.it
<b>Date of birth</b>	16-07-1967
	<i>married</i>
<b>Education</b>	
05/1998 – 09/1998	<b>Postdoctoral studies with Prof. Thomas Wirth at the University of Basel</b> Research-topics: Synthesis of enantiomerically pure diselenides and their application in asymmetric synthesis.
02/1996	<b>Doctoral degree with Prof. Marcello Tiecco at the University of Perugia</b> Thesis title: “New Synthetic Methodologies in Organic Chemistry: Conversion of functional groups catalyzed or promoted by organoselenium reagents
11/1992-11/1995	<b>Doctoral studies in the Prof. Marcello Tiecco research group at the University of Perugia.</b> Research-topics: -New synthetic methodologies for the synthesis of heterocyclic compounds: <ul style="list-style-type: none"> <li>• Stereoselective Synthesis of substituted tetrahydrofuranes</li> <li>• Cyclofunctionalization of O-allyl-oximes</li> <li>• Cyclofunctionalization of alkenyl immines</li> <li>• Cyclofunctionalization of alkenyl oxaziridines</li> </ul> - New catalytic reactions: one pot selenenylation deselenenylation reactions: <ul style="list-style-type: none"> <li>• Synthesis of 2,5-dihydrofuranes</li> <li>• Synthesis of Butenolides</li> </ul>
07/1990 -07/1992	<b>Degree in <i>Chemistry and Drugs Technology</i> at the University of Perugia</b> - thesis work in Organic Synthesis, supervisor Prof. Marcello Tiecco: “Cyclofunctionalization Reaction promoted by Electrophilic Reagents: Catalytic selenenylation-deselenenylation Reaction”
<b>Employments and Positions</b>	
12/2013	<b>National Scientific Habilitation as Full Professor</b>
10/2013-present	<b>Associate Professor</b> Dept Pharmaceutical Sciences, University of Perugia
03/2013 – 05/2013	<b>Visiting Professor of Organic Chemistry</b> , University Jan Dlugosz in Czestokowa (PL) (70hr)
01/2012 – present	<b>Member of Bioethics Committee</b> , University of Perugia

01/2009 – present	<b>Coordinator of Erasmus Agreements</b> School of Chemistry Cardiff University (since 2009) Jan Dlugosz University in Czestochowa (since 2012) University of Wroclaw (PL) (since 2014)
01/2009 – present	<b>Member of the Panel for the evaluation of Erasmus and Erasmus Placement fellowships</b> , Faculty of Pharmacy and Dept. Pharmaceutical Sciences, University of Perugia
01/2009 – present	<b>Coordinator of Nuclear Magnetic Resonance Service</b> , University of Perugia
01/2005 –09/2013	<b>Aggregate Professor</b> Dept. Chemistry and Technology of Drugs, University of Perugia
11/2010	<b>Habilitation as associated professor</b>
06/2009 (2 weeks)	<b>Visiting Professor of Organic Chemistry</b> School of Chemistry Cardiff University – UK (LLP-Erasmus Program)
06/2007 (1 week)	<b>Visiting Professor of Organic Chemistry</b> School of Pharmacy Jagellonian University Krakow –PL (LLP-Erasmus Program)
01/2002 – 01/2005	<b>Assistant Professor</b> Dept. Chemistry and Technology of Drugs, University of Perugia
10/1998 – 01/2002 11/1996 – 04/1998	<b>Research Assistant</b> ( <i>in different level of technical position</i> ) Dept. Chemistry and Technology of Drugs, University of Perugia
<b>Awards</b>	
04/2012	<b>Best Poster Award “Environmental &amp; Green Chemistry”</b> , and <b>RCS Advances Poster Prize (RCS Publishing)</b> at 12th Eurasia Conference on Chemical Sciences (Corfu 16-21 April 2012)
09/2007	<b>Tetrahedron Asymmetry: Most Cited Paper 2004-2007</b>
09/2001	<b>Award of Merit</b> , Second European Catalysis Symposium – Pisa ITALY
04/1998	<b>Research Fellowship</b> , Swiss National Fundation Basel
<b>Teaching experiences</b>	
2014 - present	Professor of <b>Organic Chemistry of Natural Compounds</b> 42 hr/year (6 CFU) at school of Pharmacy University of Perugia
2001 - present	Professor of <b>“Physical Methods for Organic Chemistry”</b> 72hr/year (9CFU) at the school of Medicinal Chemistry University of Perugia
2003 - 2011	Professor of <b>“Spectroscopic Methods for Biomolecules”</b> 32hr/year (4CFU) at the school of Biotechnology University of Perugia
2006 - 2011	Professor of <b>“Advanced Spectroscopic Methods”</b> 24hr/year (3CFU) at the school of Biotechnology University of Perugia

2006 - present	Professor of “ <b>NMR for Organic Structures Elucidation</b> ” PhD course of Medicinal Chemistry, University of Perugia
1996 - 2001	Assistant of “ <b>Physical Methods for Organic Chemistry</b> ” ; “ <b>Organic Chemistry 1</b> ” and “ <b>Organic Chemistry 2</b> ”
2006 - present	Supervisor and co-advisor of more than 50 experimental diploma work thesis, 2 incoming and 6 outgoing Erasmus Students, Lab-supervisor of 1 PhD student Advisor/coadvisor of 3 PhD thesis Supervisor of 3 post doc student. C-advisor of 3 PhD Sandwich from Brasil
<b>Boards Committee and Editorial Collaborations</b>	
2013 - present	Regional Editor of <b>Recent Patents on Catalysis</b> (Bentham)
2012 - 2013	member of the Editorial Board for <b>Journal of Chemistry and Chemical Engineering</b> (David Publishing Company – USA)
2012 - present	member of the Editorial Board for <b>Current Green Chemistry</b> (Bentham)
2012 - present	member of the Editorial Board for <b>Recent Patents on Catalysis</b> (Bentham)
2011 - present	member of the Scientific Committee for <b>electronic conference on Synthetic Organic Chemistry (ECSOC-15) (ECSOC-16) (ECSOC-17)</b> <u>edited by MDPI (Molecules)</u>
2010 - present	member of the Editorial Board for <b>Current Chemical Research</b> (Metha Press)
2014	Member of the scientific committee at <b>1st International Meeting of Molecular Chemistry, Chemometrics and applications (RICMCA-2014)</b> 29-30 May 2014 Bèni Mellal Maroc
2010	Chairman for <b>1<sup>th</sup> electronic symposium on Selenium Chemistry (ESeS-1)</b>
2008	member of the Organizing Committee of Co.Gi.Co. -Perugia
2002	member of the Organizing Committee of Italian Spanish Symposium - Perugia

## LIST OF PUBLICATIONS

H-index = 23 (based on ISI Web and Scopus)

### Peer Reviewed, Books and Chapters

1. **“Organoselenium Chemistry Between Synthesis and Biochemistry”** Ed. C. Santi - Bentham eBooks (2014) eISBN: 978-1-60805-838-9, 2014 ; ISBN: 978-1-60805-839-6
2. C. Tidei, C. Santi\* **“Selenium and Bio-Logic Catalysis: New Bioinspired Catalytic Reactions”** in **“Organoselenium Chemistry Between Synthesis and Biochemistry”** Ed. C. Santi - Bentham eBooks (2014) 345-361.
3. C. Santi\*, C. Tidei **“Addition reaction for the formation of C-S and C-Se bond”** in *Comprehensive Organic Synthesis* 2nd Ed., Elsevier (2014) Vol 7 605-637. **By invitation**
4. S. Giovagnoli\*, M. L. Marenzoni, M. Nocchetti, C. Santi, P. Blasi, A. Schoubben, M. Ricci. **Synthesis, characterization and in vitro extra- and intracellular activity against Mycobacterium tuberculosis infection of new second-line antitubercular drug-palladium complexes.** *J Pharm Pharmacol.* (2014), 66, 106-121. DOI: 10.1111/jphp.12162
5. S. Sternativo, B. Battistelli, L. Bagnoli, C. Santi, L. Testaferri, F. Marini\* **“Synthesis of g-lactams via a domino Michael addition/cyclization reaction of vinyl selenone with substituted amides.”** *Tet. Lett.* (2013), 54, 6755-6757.
6. C. Santi\* in *Science of Synthesis* vol. 39- (2013) Thieme: 39.18.2 **“Alkaneselenols”**, 391-405. **By invitation**
7. C. Santi\* in *Science of Synthesis* vol. 39- (2013) Thieme: 39.19.1.2 **“Acyclic Alkaneselenolates”**, 407-425. **By invitation**
8. S. Santoro, S. Superchi, F. Messina, E. Santoro, O. Rosati, C. Santi, M.C. Marcotullio **“Agarsenone, a Cadinane Sesquiterpenoid from Commiphora erythraea”** *J. Nat Prod.* (2013), 76, 1254-1259.
9. C. Santi\*, F. Galli, M. Piroddi, C. Tidei **“Thiols Oxidation for the Evaluation of Gpx-Like Activity”** *Phosphorus, Sulfur, and Silicon and the Related Elements* (2013), 188, 507-508 DOI: 10.1080/10426507.2012.727924 *abstract in conference*
10. S. Propersi, C. Tidei, L. Bagnoli, F. Marini, L. Testaferri, C. Santi\*, **“On-Water thiolysis of epoxides promoted by PhSZnBr”** *J. Sulfur. Chem.*, 2013, 36, 671-676 DOI:10.1080/17415993.2013.781604
11. C. Santi\*, C. Tidei, C. Scalera **“Selenium containing compounds: from poison to drug candidates (A review on the GPx-like activity)”** *Curr. Chem. Biol.* 2013 , 7, 25-36

12. L. El Firdoussi, A. Mehdi, C. Santi, S. Giovagnoli, M. Nocchetti, M. At Ali, **Colloidal Nickel(0)-carboxymethyl cellulose particles: a Biopolymer-inorganic Catalyst for Hydrogenation of Nitro-aromatics and Carbonyl compounds** *Cat. Commun.*, **2013**, *32*, 92-100.
13. L. Bagnoli\*, S. Casini, F. Marini, C. Santi, L. Testaferri **“Vinyl selenones: annulation agents for the synthesis of 6-membered benzo-1,4-heterocyclic compounds.”** *Tetrahedron*, **2013**, *69*, 481-486,
14. B. Natalini, C. Santi **“Risonanza Magnetica Nucleare”** in *Principi di Analisi Farmaceutica*, Eds. V. Cavrini, V. Andrisano, Società Editrice Esculapio, **2013**, pp 393-412. ISBN 978-88-7488-529-9
15. Legnaioli\*, S.; Piroddi, M.; Tidei, C.; Santi, C.; Galli, F. **“Targeting the GSTP-dependent control of cell kinases and apoptosis with PhSeZnCl: a new seleno-organic drug”** *Free Radical Biology and Medicine* vol. 53 September, **2012**. p. S112 DOI: 10.1016/j.freeradbiomed.2012.08.235. *Abstract in conference*
16. Legnaioli\*, S.; Piroddi, M.; Tidei, C.; Santi, C.; Galli, F. **“PhSeZnCl: a new seleno-organic compound with glutathione peroxidase-like activity”** *Free Radical Biology and Medicine* vol. 53 September, **2012**. p. S147 DOI: 10.1016/j.freeradbiomed.2012.08.308 *Abstract in conference*
17. **C. Santi\***, C. Tidei, **Electrophilic Se/Te reagents: reactivity and their contribution to "Green Chemistry"** in *The Chemistry of Organic Selenium and Tellurium Compounds*, Vol 4, edited by Z. Rappoport. John Wiley & Sons, Ltd: Chichester, UK, pp. 569-655. DOI:10.1002/9780470682531.pat0720 **By invitation**
18. **C. Santi\***, R. Di Lorenzo, C. Tidei, L. Bagnoli, T. Wirth **“Stereoselective Selenium catalyzed Dihydroxylation and Hydroxymethoxylation of Alkenes”** *Tetrahedron* (**2012**), *68*, 10530-10535 <http://dx.doi.org/10.1016/j.tet.2012.08.078>
19. C. Santi\*, B. Battistelli, L. Testaferri, M. Tiecco **“On-Water preparation of phenylselenoesters”** *Green Chem.* **2012**, *14*, 1277-1280 DOI:10.1039/C2GC16541D.
20. C. Tidei, F. Piroddi, F. Galli, **C. Santi\*** **“Oxidation of thiols promoted by PhSeZnCl”** *Tetrahedron Letters.* **2012** *53*, 232-234
21. **C. Santi\***, V. Dragone, L. Di Schino, A. Antosweska, C. Tidei **“Bio-Logic Oxidations”** *Chim. & Ind.* **2011**, *8*, 99-101
22. **C. Santi\***, **“Phenylselenenylzinc halides”** (**2011**), *Encyclopedia of Reagents for Organic Synthesis*, John Wiley & Sons Ltd., <http://onlinelibrary.wiley.com/book/10.1002/047084289X> [3/10/2011], DOI:

- 10.1002/047084289X.rn01352 **By invitation**
23. C. Santi\*, S. Santoro "Electrophilic Selenium Reagents" in "Organoselenium Chemistry" Ed. T. Wirth, Wiley-VCH, 2011 – pp. 1-51. **By invitation**
24. M. Senatore, A. Lattanzi, S. Santoro, C. Santi, G. Della Sala "Desymmetrization of meso-aziridines with chalcogen centered nucleophiles: a general and highly enantioselective approach mediated by VAPOL-hydrogen phosphate" *Org. Biomol. Chem.*, 2011, 9, 6205-6207.
25. B. Battistelli, L. Testaferri, M. Tiecco, C. Santi\* "On-Water" Michael type Addition Reactions promoted by PhSeZnCl" *Eur. J. Org. Chem.* 2011, 1048-1051
26. C. Santi\*, "Marcello Tiecco: 50 years of Chemistry" *Chim. & Ind.* 2011, 3, 73-74 (a tribute)
27. C. Santi,\* S. Santoro, B. Battistelli "Organoselenium Compounds as Catalysts in Nature and Laboratory" , *Cur. Org. Chem.* 2010 14, 2442-2462.
28. S. Santoro, B. Battistelli, B. Gyoka, C. W. S. Si, L. Testaferri, M. Tiecco, C. Santi,\* "Oxidation of alkynes in aqueous media catalyzed by diphenyl diselenide" *Synlett* 2010 , 1402-1406.
29. M.C. Marcotullio, C. Santi, G. N. Oball-Mend Mwankie, M. Curini "Chemical Composition of the Essential Oil of *Commiphora erythraea*" *Nat. Prod. Commun.* 2009, 4, 1751-1754.
30. D. M. Freudendahl, S. Santoro, S. A. Shahzad, C. Santi,\* T. Wirth\* "Green Chemistry with Selenium Reagents: Development of Efficient Catalytic Reactions" *Angew. Chem. Int. Ed.*, 2009, 48, 8409-8411.
31. S. Santoro, B. Battistelli, L. Testaferri, M. Tiecco, C. Santi,\* "Vinyllic Substitutions Promoted by PhSeZnCl: Synthetic and Theoretical Investigations" *Eur. J. Org. Chem.* 2009, 4921-4925.
32. C. Santi\*, S. Santoro, F. Pascolini, C. Tomassini, M. Tiecco Asymmetric methoxy selenenilation of  $\alpha,\beta$ -unsaturated aldehydes *Synlett* 2009, 743-746.
33. S. Santoro, C. Santi\*, M. Sabatini, L. Testaferri, M. Tiecco Eco friendly olefins dihydroxylation catalyzed by diphenyldiselenide *Adv Synth Cat*, 2008, 350, 2881-2884.
34. C. Santi\*, S. Santoro, B. Battistelli, L. Testaferri, M. Tiecco Preparation of the first bench-stable phenyl selenolate: an interesting "on water" nucleophilic reagent *Eur. J. Org. Chem.* 2008, 32, 5387-5390.
35. C. Santi\*, S. Santoro, L. Testaferri, M. Tiecco A simple zinc mediated preparation

- of selenols *Synlett* **2008**, 1471-1474.
36. C. Santi\*, M. Tiecco, L. Testaferri, C. Tomassini, S. Santoro, G. Bizzoca, **Diastereo and enantioselective synthesis of 1,2-diols promoted by electrophilic selenium reagents.** *Phosphorus, Sulfur and Silicon & the Related Elements* **2008**, *183*, 956-960.
  37. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, F. Del Verme, C. Santi, L. Bagnoli, A. Temperini **Synthesis of enantiomerically enriched  $\beta$ -hydroxy selenides by catalytic asymmetric ring opening of meso-epoxides with (phenylseleno)silanes** *Tetrahedron* **2008**, *64*, 3337-3342.
  38. R. Ruzziconi, C. Santi, S. Spizzichino **Quinolinophane-derived alkyldiphenylphosphines: two homologous P,N-planar chiral ligands for palladium-catalysed allylic alkylation.** *Tetrahedron: Asymmetry* **2007**, *18*, 1742-1749.
  39. M. Tiecco, L. Testaferri, C. Santi\*, C. Tomassini, S. Santoro, F. Marini, L. Bagnoli, A. Temperini **Synthesis of enantiomerically pure  $\beta$ -azidoselenides starting from natural terpenes.** *Tetrahedron* **2007**, *63*, 12373-12378.
  40. M. Tiecco, L. Testaferri, A. Temperini, R. Terlizzi, L. Bagnoli, F. Marini, C. Santi **Stereocontrolled Synthesis of Substituted N-Arenesulfonyl Azetidines from  $\gamma$ - (Phenylseleno)alkyl Arylsulfonamides** *Org. Biomol. Chem.*, **2007**, *21*, 3510-3519
  41. M. Tiecco, L. Testaferri, A. Temperini, R. Terlizzi, L. Bagnoli, F. Marini, C. Santi **A simple synthesis of (R)-3-aminooctanoic acid (D-BAO) from (S)-1-octyn-3-ol,** *Tetrahedron Letters* **2007**, *48*, 4343-4345.
  42. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, C. Santi, L. Bagnoli, A. Temperini **Intramolecular addition of carbon radicals to aldehydes: synthesis of enantiopure tetrahydrofuran-3-ols,** *Tetrahedron* **2007** *63*, 5482-5489
  43. M. Tiecco, L. Testaferri, L. Bagnoli, C. Scarponi, F. Marini, A. Temperini, C. Santi **Organoselenium Mediated Asymmetric Cyclizations. Synthesis of Enantiomerically Pure 1,6-Dioxaspiro[4,4]nonanes** *Tetrahedron-Asymmetry* **2006**, *17*, 2768-2774.
  44. M. Tiecco, L. Testaferri, C. Santi, C. Tomassini, S. Santoro, F. Marini, L. Bagnoli, A. Temperini **Intramolecular Non-Bonding Interaction Between Selenium and Sulfur. Spectroscopic Evidences and Importance in Asymmetric Synthesis,** *European Journal of Organic Chemistry* **2006**, 4867-4873.
  45. M. Tiecco, L. Testaferri, A. Temperini, R. Terlizzi, L. Bagnoli, F. Marini, C. Santi **Synthesis of gamma- and delta-Lactones from Alkynols,** *Synlett* **2006**, 587-590.



46. M. Tiecco, L. Testaferri, L. Bagnoli, F. Marini, **C. Santi**, A. Temperini, C. Scarponi, S. Sternativo, C. Tomassini **Enantioselective Synthesis of Heterocyclic Compounds Mediated by Organoselenium Reagents.** *Arkivoc*, **2006**, 186-206.
47. M. Tiecco, L. Testaferri, L. Bagnoli, C. Scarponi, V. Purgatorio, F. Marini, A. Temperini, **C. Santi** **Synthesis of enantiomerically pure perhydro furo[2,3-b]furans.** *Tetrahedron: asymmetry*, **2005**, *16*, 2429.
48. M. Tiecco, L. Testaferri, A. Temperini, R. Terlizzi, L. Bagnoli, F. Marini, **C. Santi** **Synthesis of selenoxides by oxidation of selenides with superoxide radical anions and 2-nitrobenzenesulfonyl chloride,** *Tetrahedron letters*, **2005**, *46*, 5165.
49. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, **C. Santi**, L. Bagnoli, A. Temperini. **Conjugated Additions of Selenium Containing Enolates to Enones. Enantioselective Synthesis of  $\alpha$ -Oxo- $\beta$ -Selenoesters and Their Facile Transformations.** *Eur. J. of Org. Chem.* **2005**, 543.
50. M. Tiecco, L. Testaferri, F. Marini, L. Bagnoli, **C. Santi**, A. Temperini, C. Tomassini, S. Sternativo, **Asymmetric Syntheses Promoted by Organoselenium Reagents.** *Phosphorus, Sulfur and Silicon & the Related Elements* **2005**, *180*, 729-740.
51. **C. Santi\***, M. Tiecco, L. Testaferri, C. Tomassini, F. Marini, L. Bagnoli, A. Temperini **Kinetic Resolution of Allylic Alcohols Promoted by Electrophilic Selenium Reagents** *Phosphorus, Sulfur and Silicon & the Related Elements* **2005**, *180*, 1071
52. M. Tiecco, L. Testaferri, A. Temperini, L. Bagnoli, F. Marini, **C. Santi**, R. Terlizzi **Short Synthesis of (R)- and (S)-4-Amino-3-Hydroxybutyric Acid (GABOB).** *Synthesis* **2005**, *4*, 579.
53. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, R. Bonini, F. Marini, L. Bagnoli, A. Temperini **A Chiral Electrophilic Selenium Reagent To Promote the Kinetic Resolution of Racemic Allylic Alcohols.** *Organic Letters* **2004**, *6*(25), 4751.
54. M. Tiecco, L. Testaferri, A. Temperini, R. Terlizzi, L. Bagnoli, F. Marini, **C. Santi.** **Synthesis of substituted Se-phenyl selenocarboxylates from terminal alkynes.** *Eur. J. of Org. Chem.* **2004**, *16*, 3447.
55. M. Tiecco, L. Testaferri, L. Bagnoli, R. Terlizzi, A. Temperini, F. Marini, **C. Santi**, C. Scarponi **Synthesis of enantiomerically pure perhydrofuro [3,4-b]pyrans and perhydrofuro [3,4-b] furans** *Tetrahedron: Asymmetry* **2004**, *15*(12), 1949.
56. M. Tiecco, L. Testaferri, A. Temperini, L. Bagnoli, F. Marini, **C. Santi** **Ring Closure Reactions by Intramolecular Displacement of the Phenylselenonyl Group by Nitrogen Nucleophiles. A New Stereospecific Synthesis of N-Tosyl and N-Benzoyl-1,3-Oxazolidin-2-ones from  $\beta$ -Hydroxyalkyl Phenyl Selenides.** *Chem. Eur J.* **2004**,

- 10, 1752.
57. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, **C. Santi**, L. Bagnoli, A. Temperini. **Asymmetric aldol reactions from titanium enolates of  $\alpha$ -seleno ketones and esters.** *Tetrahedron: Asymmetry* **2004**, *15*, 783.
58. M. Tiecco, L. Testaferri, L. Bagnoli, V Purgatorio, A. Temperini, F. Marini, **C. Santi** **Synthesis of Optically Pure Substituted Tetrahydrofurans from Epoxides and Phenylselenium Reagents.** *Tetrahedron: Asymmetry* **2004**, *15*, 405.
59. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, **C. Santi**, L. Bagnoli, A. Temperini **Selenium-promoted Synthesis of Enantiomerically Pure Substituted Morpholines Starting from Alkenes and Chiral Aminoalcohols.** *Tetrahedron: Asymmetry* **2003**, *14*, 2651.
60. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, **C. Santi**, L. Bagnoli, A. Temperini **Synthesis of Optically Pure 1,4-Dioxanes from Alkenes Promoted by Organoselenium Reagents.** *Tetrahedron: Asymmetry* **2003**, *14*, 1095.
61. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, F. Marini, L. Bagnoli, A. Temperini **Asymmetric Azidoselenenylation of Alkenes: A Key Step for the Synthesis of Enantiomerically Enriched Nitrogen-Containing Compounds.** *Angew. Chem. Int. Ed.* **2003**, *42*, 3131.
62. M. Tiecco, L. Testaferri, A. Temperini, L. Bagnoli, F. Marini, **C. Santi**. **A New Synthesis of  $\alpha$ -Phenylseleno *g*- and *d*-Lactones from Terminal Alkynes.** *Synlett* **2003**, 665.
63. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, F. Marini, L. Bagnoli, A. Temperini **Asymmetric Synthesis of Thioamido Selenides. A Simple Synthetic Route to Enantiopure Thiazolines.** *Tetrahedron: Asymmetry* **2002**, *13*, 429.
64. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, F. Marini, L. Bagnoli, A. Temperini **Preparation of a New Chiral non Racemic Sulfur-Containing Diselenide and Applications in Asymmetric Synthesis.** *Chem. Eur J.* **2002**, *8*, 1118.
65. M. Tiecco, L. Testaferri, L. Bagnoli, V. Purgatorio, A. Temperini, F. Marini, **C. Santi** **Efficient Asymmetric Selenocyclizations of Alkenyl Oximes into Cyclic Nitrones and 1,2-Oxazines Promoted by Sulfur Containing Diselenides.** *Tetrahedron: Asymmetry* **2001**, *12*, 3297
66. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, **C. Santi**, L. Bagnoli, A. Temperini **Optically Active Isoxazolidines and 1,3-Amino Alcohols by Asymmetric Selenocyclization Reactions of *O*-Allyl Oximes.** *Tetrahedron: Asymmetry* **2001**, *12*, 3053.

67. M. Tiecco, L. Testaferri, A. Temperini, L. Bagnoli, F. Marini, **C. Santi** **Oxidation of Diphenyl Diselenide with 2,3-Dichloro-5,6-dicyanobenzoquinone (DDQ). A New Method for the Electrophilic Phenylselenenylation of Alkenes under Mild Conditions.** *Synlett.* **2001**, 1767.
68. M. Tiecco, L. Testaferri, F. Marini, S. Sternativo, L. Bagnoli, **C. Santi**, A. Temperini **A Sulfur Containing Diselenide as Efficient Chiral Reagent in Asymmetric Selenocyclization Reactions.** *Tetrahedron: Asymmetry* **2001**, *12*, 1493.
69. M. Tiecco, L. Testaferri, A. Temperini, L. Bagnoli, F. Marini, **C. Santi** **A New Synthesis of  $\alpha$ -Phenylseleno Esters and Acids from Terminal Alkynes** *Synlett.* **2001**, 706.
70. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, F. Marini, L. Bagnoli, A. Temperini. **New Nitrogen Containing Chiral Diselenides: Synthesis and Asymmetric Addition Reactions to Olefins.** *Tetrahedron: Asymmetry* **2000**, *11*, 4645.
71. M. Tiecco, L. Testaferri, **C. Santi**, C. Tomassini, L. Bagnoli, F. Marini, A. Temperini. **Asymmetric Amidoselenenylation of Alkenes Promoted by Camphorselenenyl Sulfate: A Useful Synthetic Route to Enantiopure Oxazolines.** *Eur. J. Org. Chem.* **2000**, 3451.
72. M. Tiecco, L. Testaferri, L. Bagnoli, F. Marini, A. Temperini, C. Tomassini, **C. Santi.** **Efficient Asymmetric Selenomethoxylation and Selenohydroxylation of Alkenes with a New Sulfur Containing Chiral Diselenide.** *Tetrahedron Letters* **2000**, *41*, 3241.
73. **C. Santi**, T. Wirth. **Synthesis of Non Racemic Nitrogen Containing Diselenides As Efficient Precursor Catalyst in the Addition to benzaldehyde** *Tetrahedron Asymmetry* **1999**, *10*, 1019-1023.
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### **On line and CD-ROM publications**

92. **S. Propersi, C. Tidei, L. Sancineto, L. Bagnoli, F. Marini and C. Santi\*** **"PhSZn-halides: New Green Thiolates"** in *Proceedings of 17th International Electronic Conference on Synthetic Organic Chemistry (ECSOC 17)* Eds Julio A. Seijas, M. Pilar Vázquez Tato,2013 MDPI, Basel, Switzerland. ISBN: 978-3906980-43-0 CDROM Edition
93. **V. Frullini, S. Sternativo, C. Santi, L. Bagnoli, F. Marini\*** **"Stereoselective synthesis of cyclopropanes from vinyl selenones via a Michael-initiated ring closure reaction"** in *Proceedings of 17th International Electronic Conference on Synthetic Organic Chemistry (ECSOC 17)* Eds Julio A. Seijas, M. Pilar Vázquez Tato,2013 MDPI, Basel, Switzerland. ISBN: 978-3906980-43-0 CDROM Edition
94. **K. Berettoni, F. Marini, C. Santi, L. Bagnoli\*** **"An efficient cascade reaction for the synthesis of oxazino[4,3-a]indoles and pyrano[3,4-b]indoles from vinyl selenones"** in *Proceedings of 17th International Electronic Conference on Synthetic Organic Chemistry (ECSOC 17)* Eds Julio A. Seijas, M. Pilar Vázquez Tato,2013 MDPI, Basel, Switzerland. ISBN: 978-3906980-43-0 CDROM Edition
95. **L. Di Schino, F. Mangiavacchi, A. Antoszewska, J. Scianowski and C. Santi\*** **"Eco-Friendly Selenium Catalyzed Oxidative Cyclizations"** Electronic Conference of Synthetic Organic Chemistry (ECSOC-16) Published online: 30 October 2012 and CD

ROM Edition ISBN: 3-906980-26-X MDPI, Basel, Switzerland

96. **L. Incipini, E. Rongoni, L. Bagnoli, F. Marini and C. Santi\*** **“New chiral electrophilic selenium reagents: synthesis and structural investigation”** Electronic Conference of Synthetic Organic Chemistry (ECSOC-16) Published online: 30 October 2012 and CD ROM Edition ISBN: 3-906980-26-X MDPI, Basel, Switzerland
97. C. Tidei, V. Saccomandi, L. Bagnoli, F. Marini C. Santi **“Green Oxidations of Aldehydes to Carboxylic Acids and Esters”** Electronic Conference of Synthetic Organic Chemistry (ECSOC-16) Published online: 30 October 2012 and CD ROM Edition ISBN: 3-906980-26-X MDPI, Basel, Switzerland
98. **Santi, C.\***; Scalera C.; Tidei C.; Dragone, V.; Incipini, L.; Di Schino L. **“Green Chemistry for Environmental Sustainability: An Example of "Bio-Logic" Approach”** 1<sup>st</sup> World Sustainability Forum (Proceedings in *Sustainability*)- **2011** – first published online <http://www.sciforum.net/presentation/675/>
99. **C. Santi\***, S. Santoro, M. Tiecco **“The Nature of Nonbonded Interactions between Divalent Selenium and Sulfur: a Theoretical Investigation”** Electronic Conference of Synthetic Organic Chemistry (ECSOC-15) **2011** CD-ROM edition (ISBN: 3-906980-25-1) first published online <http://www.sciforum.net/presentation/667/>
100. **C. Santi\***, R. Di Lorenzo, B. Battistelli, C. Scalera, C. Tidei, V. Dragone, L. Incipini, L. Di Schino, E. Rongoni, L. Testaferri, M. Tiecco **“Bioinspired Use of Organoselenium Catalysts”** Electronic Conference of Synthetic Organic Chemistry (ECSOC-15) **2011** CD-ROM edition (ISBN: 3-906980-25-1) first published online <http://www.sciforum.net/presentation/665/>
101. F. Galli, F. Pilolli, B. Battistelli, M. Piroddi, C. Tidei, **C. Santi,\*** **“Selenocysteine a key amino acid for some redox enzymes”** 1th Electronic Symposium on Selenium Chemistry **2010** <http://eses1.chimfarm.unipg.it> Published on line: 10 December **2010**.
102. **C. Santi,\*** B. Battistelli, A. Casagrande, G. Pintus, C. Tidei, L. Testaferri, M. Tiecco **“Zinc mediated Synthesis of Vinyl Selenide and GPx-like activity”** 14th International Electronic Conference on Synthetic Organic Chemistry **2009** [www.mdpi.org/ecsoc-14](http://www.mdpi.org/ecsoc-14) Published on line: 30 October **2010** by MDPI, Basel, Switzerland.

103. **C. Santi**,\* S. Santoro, B. Battistelli, B. Gyoka, C. W. S. Si, L. Testaferri, M. Tiecco “**Selenium Catalyzed Oxidation of Alkynes in aqueous media**” 13th International Electronic Conference on Synthetic Organic Chemistry **2009** [www.mdpi.org/ecsoc-13](http://www.mdpi.org/ecsoc-13) Published on line: 30 October **2009** by MDPI, Basel, Switzerland.
  
104. **C. Santi**, S. Santoro, F. Pascolini, C. Tomassini, M. Tiecco “**Asymmetric methoxyselenenylation of  $\alpha,\beta$ -unsaturated carbonyl derivatives**” 12th International Electronic Conference on Synthetic Organic Chemistry CD-ROM edition **ISBN 3-906980-20-0** Published in **2008** by MDPI, Basel, Switzerland © 2008 by MDPI, Basel, Switzerland
  
105. **C. Santi**, D. Coppetta, S. Santoro, G. Basta, P. Montanucci, L. Racanicchi, R. Calafiore “**NMR Analysis of Non Hydrolyzed Samples of Sodium Alginate**” 12th International Electronic Conference on Synthetic Organic Chemistry CD-ROM edition **ISBN 3-906980-20-0** Published in **2008** by MDPI, Basel, Switzerland © 2008 by MDPI, Basel, Switzerland

**LIST OF  
SELECTED  
TALKS  
INVITED AND  
PLENARY  
LECTURES**

1. C. Santi **“Chalcogens in New Catalytic Reactions”** invited lecture in ISOCS-26 26th International Symposium on Organic Chemistry of Sulfur 24-29 August, Istanbul, TURKEY.
2. C. Santi **"New frontiers for Organoselenium Chemistry: catalysis, materials and drugs"** Invited Plenary Lecture at 1st International Meeting of Molecular Chemistry, Chemometrics and applications (RICMCA-2014) 29-30 May 2014 Bèni Mellal Maroc
3. **C. Santi**, Luana Bagnoli, Francesca Marini **“Development on the use of Organoselenium Compounds in Catalysis- Our First 20 Years”** 13° Giornata Scientifica Borsisti CINMPIS – 18 Dec 2013, Perugia ” Invited Lecture
4. C. Santi **“The Green Side of the Moon”** Invited Plenary Lecture at ICCST12– International Conference on the Chemistry of Selenium and Tellurium - July 22-26, 2013, Cardiff, Wales, United Kingdom
5. **C. Santi “Bio-Logic” Reagents and Reactions: Organoselenium Compounds toward the Green Chemistry”** Invited Lectures at
  - i) **Institute of Chemistry, Byalistok University** – Byalistok, Poland 17 April 2013
  - ii) **Department of Pharmacy – Collegium Medicum Bydgoszcz University**, Bydgoszcz – Poland, 12 April 2013
  - iii) **Organic Chemistry Department Gdansk University of Technology**, Gdansk – Poland, 10 April 2013
  - iv) **Institute of Chemistry –Faculty of Science of Siedlce University**, Siedlce – Poland 9 April 2013
  - v) **Department of Organic Chemistry, Marii Curie-Sklodowskiej University** Lublin –Poland 8 April 2013 included on the frame of the conferences promoted by the Polish Society of Chemistry
  - vi) **Department Of Chemistry, Adam Mickiewicz University POZNAŃ** - Poland 25 March 2013 included on the frame of the conferences promoted by the Polish Society of Chemistry
  - vii) **University of Lodz** - Poland 22 March 2013 included on the frame of the conferences promoted by the Polish Society of Chemistry
  - viii) **Faculty of Chemistry, Wrocław University of Technology** - Poland 15 March 2013
  - ix) **University Jan Dlugosz in Czestokowa** Poland 13 March 2013
  - x) **Polish National Academy of Science Lodz** Poland 11 March 2013
  - xi) **University N. Copernicus of Torun** Poland 8 March 2013
- 6) **C. Santi “Bio-Logic” Reagents and Reactions: Organoselenium Compounds toward the Green Chemistry”** Invited Lecture at UFePEL Universidad Feral de Pelotas –Brazil -10th Dec 2012



- 7) **C. Santi "Bio-Logic" Reagents and Reactions: Organoselenium Compounds toward the Green Chemistry** 4<sup>o</sup> Encontro sobre Selênio e Telúrio Brasil - ESeTe IV – Torres Brazil December 2012 (**Invited Plenary Lecture**)
- 8) **Santi, C.;** Tidei, C.; Scalera, C.; Incipini, L.; Marini, F.; Bagnoli, L.; Testaferri, L. **"Bioinspired Catalytic Oxidation Reactions in Water: Not Simply Green Chemistry"** XXXIV Convegno della Divisione di Chimica Organica "SCI 2012, Pavia": Pavia, 10-14 Settembre 2012.
- 9) **C. Santi**, "Bioinspired and Metal Free Catalytic Oxidations: a "Bio-Logic" use of Organoselenium reagent in Green Chemistry" Eurasia 12 Corfù, Greece 16-21 April **2012 (invited lecture)**
- 10) **C. Santi**, "Selenocisteina e derivati seleniorganici in processi di ossidazione Biologica" 2<sup>th</sup> National Conference on "Chimica Verde Chimica Sicura" - June **2011** Pavia - ITA
- 11) **C.Santi** " Catalisi "Bio-Logica": tra Green Chemistry e molecole biologicamente attive" at the School of Pharmacy Università di Urbino IT May, **2011 (invited lecture)**
- 12) **C. Santi**, "Bio-inspired use of Selenocystine as catalyst for the oxidation of C-C double bond" 11<sup>th</sup> International Conference on Selenium and Tellurium - 1,6 Aug **2010** Oulu, Finland
- 13) **C. Santi**, "New Selenium containing Catalysts: a Bio-mimetic approach" HALCHEM V (Halogen Chemistry) international conference - Santa Margherita di Pula IT, September **2010 (invited lecture)**
- 14) **C. Santi**, "Selenium Chemistry: Catalyst for Sustainability" RICMD4 4th International Meeting On Molecular Chemistry and Development 24-27 November **2010** - Marrakech – Morocco (**invited plenary lecture**)
- 15) **C. Santi** "Organoselenium Chemistry and Asymmetric Synthesis" 03. July **2009** Cardiff University –UK (invited plenary lecture)
- 16) **C. Santi** "Selenium Chemistry: looking for sustainability" 07. July **2009** Cardiff University –UK (invited plenary lecture)
- 17) **C.Santi** "New Challenge for an Organoselenium Chemistry" at the School of Pharmacy Università di Salerno IT October, **2008 (invited plenary lecture)**
- 18) **C.Santi** "New Challenge for an Organoselenium Chemistry" at the School of Pharmacy Università di Urbino IT May, **2008 (invited lecture)**
- 19) **C.Santi** "Use of Organoselenium Reagents in Asymmetric Synthesis: New Challenge for an Old Chemistry at the School of Pharmacy Yagellonian University of Kracov PL 3, July, **2007 (invited lecture)**
- 20) **C.Santi** "Diastereo and Enantioselective Synthesis of 1,2-Diols Promoted by Electrophilic Selenium Reagents" ICCST-10 International Conference on Chemistry of Selenium and Tellurium, Lodz - PL 28, June, **2007**
- 21) **C.Santi** "Use of Organoselenium Reagents in Asymmetric Synthesis: New Challenge for an Old Chemistry" at the Department of Organic and Nuclear Chemistry, Faculty of Science, Charles University, Praha, Czech R. 22, June, **2007 (invited lecture)**
- 22) **C.Santi** "Use of Organoselenium Reagents in Asymmetric Synthesis: New Challenge for an Old Chemistry" at the EPFL of Losanne CH 23, October, **2006 (invited lecture)**
- 23) **C.Santi** "Use of Organoselenium Reagents in Asymmetric Synthesis: New Challenge for an Old Chemistry" at the Department of Organic Chemistry University of Geneve CH 22, October, **2006. (invited lecture)**

## SCIENTIFIC INTERESTS

- 24) **C.Santi** "Selective Azidoselenenylation of Terpenes", VI° Italian Spanish Symposium on Organic Chemistry ISSOC-6 , Taormina, 16, July, **2006**
- 25) **C. Santi** "Processi di Risoluzione Cinetica Promossi da Reattivi Selenorganici Enantiopuri", XXX Convegno della Divisione di Chimica Organica della Società Chimica Italiana , Siena, 19-23 September **2005**
- 26) **C. Santi** "New Chiral Arylselenenyl Halides Stabilized by a Non Bonding Interaction Between Selenium and Sulfur. Structural Characterization and Synthetic Applications" 3th Transmediterranean Colloquium on Heterocyclic Chemistry, , Marrakech, Marocco, 23-27, November, **2004**.
- 27) **C. Santi** "Kinetic Resolution of Allylic Alcohols promoted by Electrophilic Selenium Reagents" International Conference on the Chemistry of Selenium and Tellurium (ICCST-9) , Bombay, India. February, 23, **2004 (invited lecture)**
- 28) **C. Santi** "Preparation of Optically Enriched Allylic Alcohols through a Kinetic Resolution process Promoted by Electrophilic Selenium Reagents" 13th European Symposium on Organic Chemistry , Dubrovnik (Croatia) September **2003**.
- 29) **C. Santi** "Synthesis of enantiomerically enriched nitrogen containing compounds through asymmetric azido selenenylation of olefines" 2nd Transmediterranean Colloquium on Heterocyclic Chemistry , Bari. June, **2002**.
- 30) **C. Santi** "Asymmetric Azidoselenenylation Promoted by Chiral Electrophilic Selenium Reagents" Third Italian-French Meeting in Organic Chemistry. Organic Chemistry Towards Interfaces, Pisa. November, **2002**.
- 31) **C. Santi** "Chiral Non Racemic Diselenides as Catalysts in Asymmetric Syntheses", Second European Catalysis Symposium , Pisa, 23-26, September **2001**.
- 32) **C.Santi** "Synthesis of enantiomerically pure Oxazolines and Thiazolines promoted by Camphor Selenenyl Sulfate" 17<sup>th</sup> International Congress of Heterocyclic Chemistry, 5 August **1999** - Vienna

### Organochalcogen Chemistry

- Stereoselective and Asymmetric Synthesis
- Catalysis (oxidation, cyclofunctionalization)
- Synthesis and synthetic applications of the complexes PhSeZn-Halides and ArSZn-Halides as the first class of bench stable chalcogenates.
- Synthesis of small organoselenium compounds with Antiviral, Antimicrobial, and antioxidant activity
- Green Chemistry

### Future plans

- Synthesis of new chalcogen based heterogeneous catalysts for application in flow chemistry. (*Project accepted for a grant of a local Foundation*)
- Elucidation of the chemical mechanism played by Selenium, Selenoproteins and zinc-finger proteins in vascular disorders and repair. (*Proposal submitted to Human Frontiers Science Program by a team composed by C. Santi [PI-Univ. Perugia], C. Schiesser [Univ. Melbourne], M. Iwaoka [Univ. Tokay], E. Lenardao [Univ. Pelotas]*)
- Synthesis of selenopeptides for the treatment of vascular disorders and repair. (*Proposal submitted for a grant of IRRTF, University of Melbourne*)

### - Short overview -

Over the last thirteen years, many important chemical transformations were efficiently achieved using organoselenium intermediates. These reactions are realized using mild conditions and are, usually, characterized by high chemio regio and stereoselectivity.

**My early researches** focused on the use of electrophilic selenium reagents in stereoselective functionalization and cyclofunctionalization reactions. We demonstrated that in the presence of a stoichiometric oxidant selenium act as catalyst in “one-pot” selenenylation deselenenylation processes (*J. Chem. Soc. Chem. Commun.*, 1993, 637).

The synthesis of some new optically pure diselenides as precursors of selenenylating reagents allowed the synthesis of enantiomerically enriched functionalized compounds and/or heterocycles (*Chem. Eur J.* **2002**, *8*, 1118 and *Angew. Chem. Int. Ed.* 2003, *42*, 3131) and we demonstrated the possibility to perform the non-enzymatic kinetic resolutions of allylic alcohols (*Organic Letters* 2004, *6*(25), 4751).

**Currently my research** can be divided in 3 main topics:

- **Synthesis and synthetic applications of new zinc chalcogenates for reaction in non-conventional medium.** We know that the active species in the catalytic task of GPx is a selenolate stabilized by hydrogen bound in a catalytic triade. During our efforts on reproducing a synthetically useful selenolate we described the preparation of the first class of bench stable selenium centered nucleophile reagents (PhSeZnCl, PhSeZnBr). The reaction is a simple oxidative insertion of elemental zinc into commercially available PhSeCl PhSeBr. These reagent are good selenenylating agents and were successfully employed in several reactions such as: the ring opening of epoxides, the nucleophilic substitution of aliphatic, acyl, vinyl and aromatic halides, the Michael type addition reactions, observing in all the cases an interesting rate acceleration in “on water” conditions. (*Eur. J. Org. Chem.* **2008**, *32*, 5387; *Eur. J. Org. Chem.* **2009**, 4921; *Eur. J. Org. Chem.* **2011**, 1048-1051; *eEROS* **2011**, *Green Chemistry* **2012**, *14*, 1277-1280)

In consideration of the similarity with the physiological selenium atom present in the catalytic center of the glutathione peroxidase, the ability of PhSeZnCl on reducing peroxides in the presence of a thiol as cofactor was evaluated. We demonstrated an interesting GPx-like activity that is now under confirmation by in vitro cell tests. (*Tetrahedron Letters* **2012**, *53*, 232-234)

Similarly, zinc thiolates can be preparer and used in on water conditions as well as in solvent free conditions. (*J. Sulf. Chem.* **2013**)

- **Bioinspired catalytic oxidations:** Catalysis is one of the most relevant aspect that we **recently** investigated also in combination with the use of environmentally benign solvents paying attention on the reduction of the waste production, without compromising the yields and the chemio- regio- and stereoselectivity of the reactions. We first highlighted that selenium catalyst could be considered convenient reagents for new eco-friendly reactions. (*Angew. Chem. Int. Ed.* **2009**, *48*, 8409). Using water or aqueous reaction media we demonstrated that diphenyl diselenide catalyze the oxidation of double and triple bonds mediated by persulfate affording respectively vicinal diols and 1,2 dicarbonyl derivatives. (*Phosphorus, Sulfur and Silicon & the Related Elements* **2008**, *183*, 956 and *Synlett* **2010** , 1402-1406). More interestingly using as

stoichiometric oxidant aqueous hydrogen peroxide, diphenyl diselenide promote the direct stereoselective dihydroxylation of olefins through the formation of a non isolable epoxide intermediate (*Adv Synth Cat*, **2008**, 350, 288 ) and when the pre-catalyst is the selenocystine the 1,2- diols of methyl cyclohexene has been obtained in 86% of ee. We also demonstrated that the reaction medium containing the water soluble catalyst, can be reused several time after the extraction of the products (*Tetrahedron* **2012**, 68, 10530 ). A procedure similar to those used for the synthesis of diols was envisioned in an intramolecular version starting from alkenols and alkenoic acids obtaining respectively hydroxyl-tetrahydrofuranes and hydroxyl-lactones as versatile intermediate for the synthesis of bioactive compounds. (*unpublished results*) The same oxidizing machinery has been applied successfully to the click-synthesis of oxaziridines from primary amines and ketones or aldehydes (*manuscript submitted to Angewandte Chemie*) and to the fast oxidation of aldehydes to carboxylic acids and esters using a stoichiometric amount of peroxide.

- **Synthesis of new biologically active organoselenium derivatives.** Increasing evidence suggests a correlation between oxidative stress and HIV pathogenicity, indeed reactive oxygen species could enhance viral replication and infectivity while the virus itself, with its high rate of replication, could yield oxidative stress shattering host structures and destroying host cells. Compounds containing a selenium-selenium bound are among the most efficacious antioxidants mimicking the activity of the key antioxidant enzyme glutathione peroxidase. A series of variously decorated diselenides inspired to the structures of the known viral nucleocapsid protein NCp7 inhibitors, 2,2-dithiobisbenzamides (DIBAs) were synthesized and their antiviral demonstrated an interesting anti-HIV activity.

Future research plans will be directed to:

- **The development of more efficient catalysts for the use in “flow” conditions.** The introduction of general systems to perform reactions under continuous flow rather than in batch mode has led to improvements regarding safety and sustainability Selenium Heterogeneous catalysts based on zirconium phosphonates will be synthesized and used in flow conditions for the oxidation of different substrates. The same catalysts will be also grafted on zirconia surface in order to obtain a chip-based microreactor suitable in terms of processing time reduction and potential for manufacturing scale-out
- **Role of Selenium and Selenoproteins in vascular disorders and of repair.** It has recently been shown that some small molecular weight selenium compounds can accelerate wound healing in diabetic mice. Although this discovery has important implications for conditions such as peripheral vascular disorders and the treatment of diabetic ulcers, the role of the selenium in the biological repair mechanism is still unexplored and cannot be simply explained on the basis of their in vitro antioxidant capacity. Endothelial nitric oxide synthase (eNOS), and matrix metalloproteinases are implicated in vascular function and wound healing. The role of selenium will be investigated in relation to its regulation of the redox equilibrium and signaling as well as in relation to its possible interaction with zinc centers in the proteins. Ab initio calculations and molecular

	<p>simulation will drive the selection of prototypal small organoselenium derivatives and selenopeptides as NO scavengers and/or eNOS inhibitors. In vivo wound healing assays and in vitro pharmacological/cellular analysis of vascular function and antioxidant activity will provide relevant information concerning the molecular origin of vascular disorders and of repair</p>
<p><b>LIST OF FOUNDS</b></p>	<p><b>Coordination and/or participation to Projects supported by third-party</b></p>
	<ol style="list-style-type: none"> <li>1. <b>PRIN 2001:</b> (coordinator Prof. M. Tiecco) <b>PARTICIPANT</b></li> <li>2. <b>PRIN 2003:</b> (coordinator Prof. M. Tiecco) <b>PARTICIPANT</b></li> <li>3. <b>PRIN 2005:</b> € 95.400 (coordinator Prof. M. Tiecco) : <u>Stereoselective Synthesis in Organic Chemistry</u>. <b>PARTICIPANT</b></li> <li>4. <b>PRIN 2007:</b> € 76.500 (coordinator Prof. M. Tiecco) <u>Stereoselective Synthesis in Organic Chemistry</u>. <b>PARTICIPANT</b></li> <li>5. <b>InfarmaZone onlus - COMUNE di PERUGIA 2009</b> (privat Foundation): € 3.000 “<u>investigation of Commiphora Essential oil</u>” (coordinator Prof. C. Santi- M. C. Marcotullio) <b>COORDINATOR</b></li> <li>6. <b>BRITISH ITALIAN PARTNERSHIP PROGRAMME 2010</b> (British Council and CRUI): € 14.000 “<u>Green Catalysts for Novel Chemistry</u>” (Italian coordinator Prof. C. Santi) <b>COORDINATOR</b></li> <li>7. <b>RICERCA DI BASE – Cassa di Risparmio di Perugia 2011</b> (privat Foundation): € 12.000 “<u>New Catalysts as GPx mimetics</u>” (coordinators Proff. C. Santi and F. Galli) <b>UNIT COORDINATOR</b></li> <li>8. <b>POR UMBRIA European Social Found 2007-2013: 2011</b> € 18.000 “<u>Bio-inspired design of New Catalysts for sustainable Chemistry</u>”(coordinator Prof. C. Santi) <b>COORDINATOR</b></li> <li>9. <b>Cassa di Risparmio di Perugia 2012</b> (privat Foundation): € 28.000 “ <u>New Eco sustainable process for the production and the analysis of pharmaceutical relevant molecules</u>” (coordinator Prof. B. Natalini, head of the synthetic unit Prof. Claudio Santi) <b>UNIT COORDINATOR</b></li> <li>10. <b>CINMPIS</b> (Interuniversity Consortium) – post-doc fellowship (03 2013-03 2014) di € 14000 for a project “<u>Design and Sinthesis of Se and S derivative for the treatment of HIV infection</u>“ (Coordinators Proff C. Santi, O. Tabarrini) <b>COORDINATOR</b></li> <li>11. <b>Cassa di Risparmio di Perugia 2013</b> (privat Foundation): € 56.000 (coordinator Prof. F. Galli) <b>PARTICIPANT</b></li> <li>12. <b>CINMPIS</b> (Interuniversity Consortium) – post-doc fellowship (05 2014-08 2014) €</li> </ol>

	4500 for a project “Design and Synthesis of Se and S derivative for the treatment of HIV infection“ (Coordinators Proff C. Santi, O. Tabarrini) <b>COORDINATOR</b>
<b>ACADEMIC THEACING</b>	
2001 - present	Professor of “ <b>Physical Methods for Organic Chemistry</b> ” 72hr/year (9CFU) at the school of Medicinal Chemistry <b>LM-13 - MASTER'S DEGREE IN PHARMACY AND INDUSTRIAL PHARMACY</b> - University of Perugia
2014 - present	Professor of “ <b>Organic Chemistry in Natural Compounds</b> ” 42hr/year (6CFU) at the school of Pharmacy <b>LM-13 - MASTER'S DEGREE IN PHARMACY AND INDUSTRIAL PHARMACY</b> - University of Perugia
2003 - 2011	Professor of “ <b>Spectroscopic Methods for Biomolecules</b> ” 32hr/year (4CFU) <b>LM-9 - MASTER'S DEGREE IN MEDICAL, VETERINARY AND PHARMACEUTICAL BIOTECHNOLOGIES</b> University of Perugia
2006 - 2010	Professor of “ <b>Advanced Spectroscopic Methods</b> ” 24hr/year (3CFU) <b>LM-9 - MASTER'S DEGREE IN MEDICAL, VETERINARY AND PHARMACEUTICAL BIOTECHNOLOGIES</b> University of Perugia
2006 - present	Professor of “ <b>NMR for Organic Structures Elucidation</b> ” PhD course of Medicinal Chemistry, University of Perugia
1996 - 2001	Assistant of “ <b>Physical Methods for Organic Chemistry</b> ” ; “ <b>Organic Chemistry 1</b> ” and “ <b>Organic Chemistry 2</b> ”
	<p><b>Additional Information about the courses of</b></p> <p><b>“Physical Methods for Organic Chemistry”</b></p> <p>The course aims at deepening of the most important instrumental methods that allow to obtain information on the structural characteristics and physico-chemical properties of organic molecules. The processing of the data thus obtained will enable the student to improve skills in the synthesis, development, production and analysis of organic substances with potential pharmaceutical interest.</p> <p><u>Main Topics</u>: Introduction to spectroscopic methods. The electromagnetic spectrum. IR spectroscopy. Mass spectroscopy. 1H NMR spectroscopy. 13C NMR Spectroscopy Introduction to spectroscopy, 31P, 19F. Overhauser Effect: 2D-NMR spectroscopy. Exercises and spectral interpretation.</p> <p><u>The textbook</u> used for the course is :</p> <p><b>Claudio Santi " Metodi Fisici in Chimica Organica"</b>  <b>Boock Open Source - free download from the web</b>  <b>(<a href="http://www.metodifisici.net/Students%20Area.html">http://www.metodifisici.net/Students%20Area.html</a>)</b></p> <p><b>“Spectroscopic Methods for Biomolecules” and “Advanced Spectroscopic Methods”</b></p> <p>The courses aims at deepening of the most important instrumental methods that allow to obtain information on the structural characteristics and physico-chemical properties of organic molecules, macromolecules and materials.</p> <p><u>First module</u>: Introduction to spectroscopic methods. The electromagnetic spectrum. IR spectroscopy. 1H NMR spectroscopy. 13C NMR Spectroscopy Introduction to</p>



spectroscopy, 31P, 19F

Second module Mass spectroscopy. Overhauser Effect, 2D-NMR spectroscopy  
Metabolomics and NMRI

### “Organic Chemistry of Natural Compounds”

The course focus on the importance of natural substances. Primary and secondary metabolites, the study of metabolism. Major biosynthetic pathways (via shikimic acid, mevalonate, the deossixilulosio phosphate). Methods of extraction and recognition of the major classes of metabolites. Phenolic compounds (anthraquinone, phenylpropanoids), terpenoids (mono - of - sesqui-, triterpenes, sterols and steroids, tetraterpenes and carotenoids), alkaloids.

### Evaluation of the course by the students (x.x/10.0)

Academic Year	Physical Methods for Organic Chemistry		“Spectroscopic Methods for Biomolecules” and “Advanced Spectroscopic Methods”	
	Average of the course (Santi, C.)	Average of all the courses of the Master Degree	Average of the course (Santi, C.)	Average of all the courses of the Master Degree
2012-13	7.4	7.4	--	--
2011-12	8.6	8.2	8.6	7.4
2010-11	8.6	8.1	8.5	7.8
2009-10	8.8	7.5	8.5	7.5
2008-09	8.7	7.9	9.1	7.6
2007-08	8.7	7.7	8.9	7.5

### List of Supervised (or assisted) PhD Thesis

1. **Dr. Cristina Tomassini** “Diastereo- and Entioselective functionalization of Organic Organic Molecules” (2006) (as lab-assistant)
2. **Dr. Stefano Santoro** “Novel Diastereo- and Entioselective Synthesis of polyfunctionalized Organic Molecules” (2008) (co-advisor with Prof. Tiecco)
3. **Dr. Benedetta Battistelli** “New Organoselenium reagents in Green Chemistry” (2012)
4. **Mrs. Caterina Tidei** “New Catalytic processes for eco-friendly conversions” (2015)
5. **Mr. Juliano Brown de Azeredo** (co-advisor with prof. Luis Antonio Braga Universidade Federal Santa Catarina BS) “PhD Sandwiches program” (2013-14)
6. **Mrs. Vanessa Nascimento** (co-advisor with prof. Luis Antonio Braga Universidade Federal Santa Catarina BS) “PhD Sandwiches program” (2013-14)
7. **Mrs. Jaqueline Vargas** (co-advisor with prof. Diogo Ludtke Universidade Federal Rio Grande do Sul BS) “PhD Sandwiches program” (2014-15)

**Perugia 2<sup>nd</sup> May 2014, Prof. Claudio Santi**

A handwritten signature in black ink, appearing to read 'Claudio Santi', written in a cursive style with a long horizontal stroke at the end.