



Dr. G Anilkumar

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Academic profile

- **Ph D** CSIR-NIIST Trivandrum
- **M Phil** CUSAT
- **M Sc** University of Kerala

Research highlight

- H-index- **21**
- Publications- **45**
- Average impact factor- **4.02**
- Citations-**1427**
- Patents-**5** (granted), **2** (filed)

Research areas

▪ Transition metal catalysis

Transition metal catalyzed cross-coupling reactions offer a powerful strategy for the construction of C-C and C-Heteroatom bonds. Our research mainly focusses on the development of novel Fe, Cu and Zn- catalyzed cross-coupling reactions

▪ Synthesis and isolation of biologically active compounds

We mainly focus on:

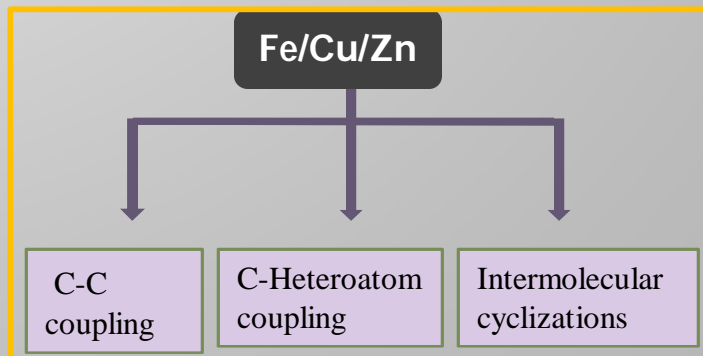
- Isolation of biologically active compounds from medicinal plants in Kerala and their phytochemical studies
- Total synthesis of biologically active compounds

Professional experience

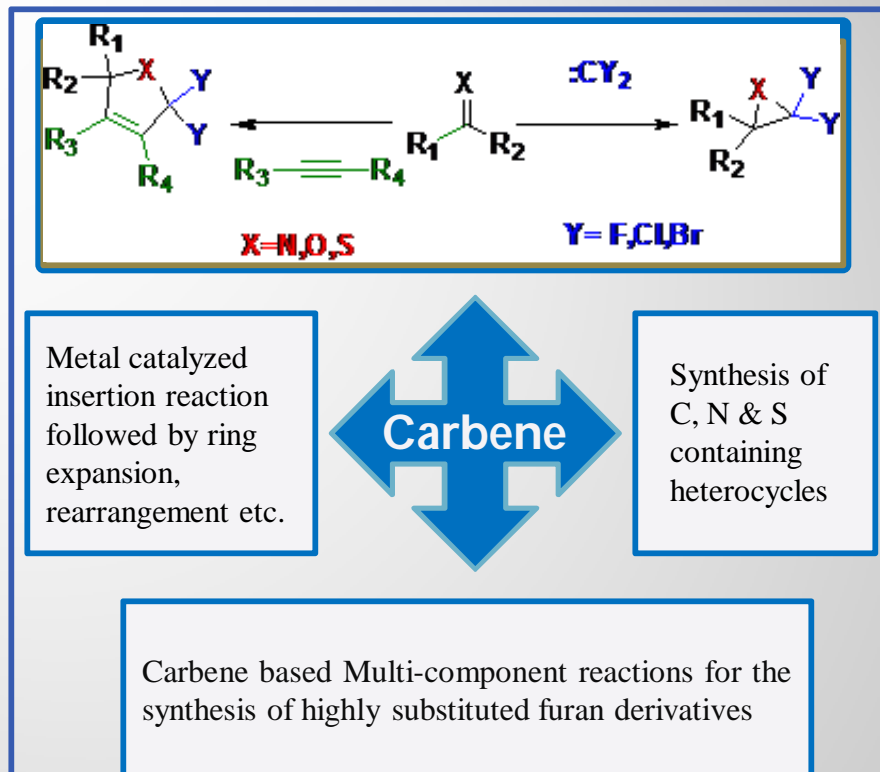
- Scientist, Leibniz-Institut für Katalyse, (LIKAT), Rostock, Germany
- Senior Scientist, AstraZeneca, India
- Scientist, Anthem Biosciences, India
- Leibniz Fellow, Leibniz-Institut für Organische Katalyse (IfOK), Germany
- NIH Fellow, Temple University, Philadelphia, USA
- JSPS Fellow, Osaka University, Osaka, Japan
- NSR Fellow, Katholike Universitat Nijmegen, The Netherlands

Teaching areas

- Stereochemistry
- Reaction Mechanism
- Reactions and Reagents
- Organic Synthesis
- Medicinal Chemistry
- Asymmetric Catalysis



▪ Carbene chemistry



▪ Photocatalytic hydrogen generation by reduction of water using photosensitizers



▪ Functionalization of natural rubber, graphene and carbon nanotubes

Publications

45. A general and inexpensive protocol for the Cu-catalyzed C-S cross-coupling reaction between aryl halides and thiols A. M. Thomas, S. Asha , K. S. Sindhu **G. Anilkumar**, *Tetrahedron Lett.*, **2015**, 56, 6560
44. Preparation of epoxy graphene and its structural and optical properties S. Yaragalla, **G. Anilkumar**, T. V. Vineeshkumar ,N. Kalarikkal, S. Thomas, *Adv. Mater. Lett.*, **2015**, 6, 848
43. An efficient zinc-catalyzed cross-coupling reaction of aryl iodides with terminal aromatic alkynes A. P. Thankachan, K. S. Sindhu, K. K. Krishnan and **G. Anilkumar**, *Tetrahedron Lett.*, **2015**, 56, 5525
42. Recent advances in the syntheses, transformations and applications of 1,1-dihalocyclopropanes A. P. Thankachan, K. S. Sindhu, K. K. Krishnan and **G. Anilkumar**, *Org. Biomol. Chem.*, **2015**, 13, 8780
41. An overview of Zn-catalyzed enantioselective Aldol type C-C bond formation A. P. Thankachan, K. K. Krishnan, **G. Anilkumar**, *RSC Adv.*, **2015**, 5, 62179
40. An efficient iron-catalyzed S-arylation of aryl and alkylthiols with aryl halides in the presence of water under aerobic conditions K. S. Sindhu, A. P. Thankachan, A. M. Thomas, **G. Anilkumar** *Tetrahedron Lett.*, **2015**, 56, 4923
39. Recent developments and applications of Cadiot-Chodkiewicz reaction K. S. Sindhu, A. P. Thankachan, P. S. Sajitha, **G. Anilkumar**, *Org. Biomol. Chem.*, **2015**, 13, 6891
38. A novel and efficient Zn-catalyzed thioetherification of aryl halides A. P. Thankachan, K. S. Sindhu, K. K. Krishnan, **G. Anilkumar**, *RSC Adv.*, **2015**, 5, 32675
37. Recent advances and perspectives in the synthesis of heterocycles via carbenes K. K. Krishnan, A. P. Thankachan, **G. Anilkumar**, *Tetrahedron* **2015**, 71, 2333
36. Goldberg reaction: Development, Mechanistic insights and Applications A. M. Thomas, A. Sujatha, **G. Anilkumar**, *Mini Rev. Org. Chem.*, **2015**, 12, 3
35. Recent Advances in Copper-catalyzed C-S cross-coupling reactions A. Sujatha, A. M. Thomas, A. P. Thankachan, **G. Anilkumar**, *ARKIVOC* **2015**, i, 1

34. A Novel Intramolecular Homoenate Annulation leading to the formation of Cyclopentene fused Macrocycles K. C. Seetha Lakshmi, C. R. Sinu, D. V. M. Padmaja, **G. Anilkumar**, E. Suresh, V. Nair, *Org. Lett.*, **2014**, *16*, 5532.
33. Recent Advances and Applications of Glaser coupling employing greener protocols K. S. Sindhu, **G. Anilkumar**, *RSC Adv.*, **2014**, *4*, 27867.
32. Recent Advances and Perspectives in Copper-catalysed Sonogashira Coupling Reactions A. M. Thomas, A. Sujatha, **G. Anilkumar**, *RSC Adv.*, **2014**, *4*, 21688.
31. Synthesis, characterisation and application of Iridium (III) photosensitisers for catalytic water reduction F. Gaertner, D. Cozzula, S. Losse, A. Boddien, **G. Anilkumar**, H. Junge, T. Schulz, .N. Marquet, A. Spannenberg, S. Gladiali and M. Beller *Chem. Eur. J* **2011**, *17*, 6998.
30. Structure and function of natural and synthetic signaling molecules in parasitic weed germination. B. Zwanenburg, A. S. Mwakaboko, A. Reizelman, **G. Anilkumar**, and D. Sethumadhavan. *Pest Manag Sci.* **2009**, *65*, 478.
29. Biomimetic Iron-catalyzed asymmetric epoxidation of aromatic alkenes by using hydrogen peroxide. F. G. Gelalcha, **G. Anilkumar**, M. K. Tse A. Brückner and M. Beller *Chem. Eur J* **2008**, *14*, 7687.
28. Iron-catalyzed asymmetric epoxidation of aromatic alkenes using hydrogen peroxide. F. G. Gelalcha, B. Bitterlich, **G. Anilkumar**, M. K. Tse and M. Beller *Angew. Chem. Int. Ed.* **2007**, *46*, 7293. (**Hot paper**)
27. Eisen katalysierte asymmetrische epoxidierung von aromatischen alkenen mit wasserstoffperoxid. F. G. Gelalcha, B. Bitterlich, **G. Anilkumar**, M. K. Tse and M. Beller *Angew. Chem.* **2007**, *119*, 7431.
26. New Ruthenium Catalysts for Asymmetric Transfer Hydrogenation of prochiral Ketones. S. Enthaler, B. Hagemann, S. Bhor, **G. Anilkumar**, M. K. Tse, B. Bitterlich, K. Junge, G. Erre and M. Beller *Adv. Synth. Catal.* **2007**, *349*, 853.
25. Development of a general and efficient iron-catalyzed epoxidation using hydrogen peroxide as oxidant. B. Bitterlich, **G. Anilkumar**, F. G. Gelalcha, B. Spilker, A. Grotevendt, R. Jackstell, M. K. Tse, and M. Beller *Chem. Asian J.* **2007**, *2*, 521.

24. A novel biomimetic Fe-catalyzed epoxidation of olefins using hydrogen peroxide. **G. Anilkumar**, B. Bitterlich, F. G. Gelalcha M. K. Tse and M. Beller *Chem. Commun.* **2007**, 289.
23. Synthetic, spectral and catalytic activity studies of some ruthenium bi- and ter-pyridine complexes: implications on the mechanism of ruthenium(pyridine-2,6-bisoxazoline)(pyridine-2,6-dicarboxylate) catalyzed asymmetric epoxidation of olefins utilizing H₂O₂. M. K. Tse, H. Jiao, **G. Anilkumar**, B. Bitterlich, F. G. Gelalcha and M. Beller *J. Organomet. Chem.* **2006**, 691, 4419.
22. Ruthenium Catalyzed Asymmetric Epoxidation of Olefins using H₂O₂ part I: Synthesis of New N,N,N-Tridentate Ligands-Pybox, pyboxazine and their Ruthenium Complexes. M. K. Tse, S. Bhor, M. Klawonn, **G. Anilkumar**, H. Jiao, C. Dobler, A. Spannenberg, W. Magerlein, H. Hugel and M. Beller *Chem. Eur. J.* **2006**, 12, 1855.
21. Ruthenium Catalyzed Asymmetric Epoxidation of Olefins using H₂O₂ part II: Catalysis and Mechanistic Studies. M. K. Tse, S. Bhor, M. Klawonn, **G. Anilkumar**, H. Jiao, A. Spannenberg, C. Dobler, W. Magerlein, H. Hugel and M. Beller *Chem. Eur. J.* **2006**, 12, 1875.
20. Synthesis of a novel class of chiral N,N,N-tridentate pyridinebisimidazoline ligands and their application in Ru-catalyzed asymmetric epoxidations. **G. Anilkumar**, S. Bhor, M. K. Tse, M. Klawonn, B. Bitterlich and M. Beller *Tetrahedron Asymmetry* **2005**, 16, 3536.
19. Synthesis of New Chiral N,N,N-tridentate Pyridinebisimidazoline Ligands and their Application in Ruthenium-catalyzed Asymmetric Epoxidations. S. Bhor, **G. Anilkumar**, M. K. Tse, M. Klawonn, C. Dobler, B. Bitterlich, A. Grotevendt and M. Beller *Org. Lett.*, **2005**, 7, 3393.
18. A Convenient Method for Epoxidation of Alkenes using Aqueous Hydrogen Peroxide. M. K. Tse, M. Klawonn, S. Bhor, C. Dobler, **G. Anilkumar** and M. Beller, *Org. Lett.*, **2005**, 7, 987.
17. Asymmetric Synthesis Using Sulfinimines (N-Sulfinyl Imines) (Review). F. A. Davis, B. Yang, J. Deng, Y. Wu, Y. Zhang, A. Rao, T. Fang, R. Goswami, K. R. Prasad, M. B. Nolt, **G. Anilkumar** *Phosphorus, Sulfur, and Silicon*, **2005**, 180, 1109. 16. Asymmetric Synthesis of the Quinolizidine Alkaloid (-)-Epimyrtine using Intramolecular Mannich Cyclization and N-Sulfinyl α -amino α -ketoesters. F. A. Davis, Y. Zhang and **G. Anilkumar**, *J. Org. Chem.* **2003**, 68, 8061.
15. An Efficient methodology for the C-C Bond-forming Radical Cyclization of Hydrophobic Substrates in water: Effect of Additives on Radical Reaction in water. H. Nambu, **G. Anilkumar**, M. Matsugi and Y. Kita, *Tetrahedron* **2003**, 59, 77.
14. A Novel and Useful Oxidative Intramolecular Coupling Reaction of Phenol Ether Derivatives on Treatment with a Combination of Hypervalent Iodine(III) Reagent and Heteropoly Acid. H. Hamamoto, **G. Anilkumar**, H. Tohma and Y. Kita, *Chem. Eur. J.*, **2002**, 8, 5377.

- 13.** A Novel and Efficient Oxidative Biaryl Coupling Reaction of Phenol Ether Derivatives Using a Combination of Hypervalent Iodine(III) Reagent and Heteropoly Acid. H. Hamamoto, **G. Anilkumar**, H. Tohma and Y. Kita, *Chem. Commun.*, **2002**, 450.
- 12.** A Simple and Efficient Iodination of Alcohols on Polymer Supported Triphenylphosphine. **G. Anilkumar**, H. Nambu and Y. Kita, *Org. Proc. Res. Dev.* **2002**, 6, 190.
- 11** Regioselective Nucleophilic Addition of Methoxybenzene Derivatives to the α -carbon of *p*-Benzoquinone mono O,S –Acetal. M. Matsugi, K. Murata, **G. Anilkumar**, H. Nambu and Y. Kita, *Chem. Pharm. Bull.* **2001**, 49, 1658.
- 10.** A Novel and Efficient Methodology for the C-C Bond-forming Radical Cyclization of Hydrophobic Substrates in Water. Y. Kita, H. Nambu. N. G. Ramesh, **G. Anilkumar** and M. Matsugi, *Org. Lett.*, **2001**, 3, 1157.
- 9.** A Facile and Efficient Sulfenylation Method Using Quinone mono-O,S-acetals Under Mild Conditions. M. Matsugi, K. Murata, K. Gotanda, H. Nambu, **G. Anilkumar**, K. Matsumoto and Y. Kita, *J. Org. Chem.*, **2001**, 66, 2434.
- 8.** A Facile Photolytic Approach to the Synthesis of Bicyclo[3.3.0]octa-3,7-diene-2,6-diones. V. Nair, D. Maliakal, **G. Anilkumar** and N. P. Rath, *Synlett*, **2000**, 1139.
- 7.** BF₃-OEt₂ Induced Rearrangement of Bicyclo[2.2.2]octenediones: An Efficient Synthesis of Bicyclo[3.2.1]octenediones. V. Nair, D. Maliakal, P. M. Tresa, **G. Anilkumar**, M. Vairamani and S. Prabhakar, *Tetrahedron* **2000**, 56, 3735.
- 6.** Novel Cycloaddition Reactions of *o*-Benzoquinones and Related Chemistry. V. Nair, S. Kumar, **G. Anilkumar**, K. V. Radhakrishnan, J. S. Nair, D. Maliakal, K. C. Sheela, B. Mathew, P. M. Tresa, A. U. Vinod, V. Sheeba and A. Thomas, *Proc. Indian Acad. Sci. (Chemical Sci.)* **1998**, 110, 507.
- 5.** Photochemical di- α -methane Rearrangement of Quinoxalinobarrelenes. V. Nair, **G. Anilkumar**, D. Maliakal, G.K. Eigendorf and P.G. Williard, *J. Photochem. Photobiol. A: Chem.* **1997**, 111, 57.
- 4.** A Facile Synthesis of Novel Pyrazinobarrelenes from Bicyclo[2.2.2]octenediones. V. Nair, **G. Anilkumar** and G.K. Eigendorf, *Indian J. Chem.* **1997**, 36B, 65.

3. Photolytic Double Decarbonylation Route to Highly Substituted Indenes and Benzene Derivatives. A. Thomas, **G. Anilkumar** and V. Nair, *Tetrahedron* **1996**, 52, 2481.
2. Boron trifluoride-Etherate Induced Rearrangement of Bicyclo[2.2.2]octene-7,8-diones: An Efficient Synthesis of Bicyclo[3.2.1]octene-2,8-diones. V. Nair, **G. Anilkumar**, G.K. Eigendorf and P.G. Williard, *Tetrahedron Lett.* **1996**, 37, 8271.
1. Diels-Alder Reactions of *o*-Benzoquinones with 6-Substituted Fulvenes: Facile Synthesis of 1-Aryl and 1,1-Diarylmethylene-4,7-ethanoindene-8,9-diones. V. Nair, S. Kumar, **G. Anilkumar** and J.S. Nair, *Tetrahedron* **1995**, 51, 9155.

Patents:

5. Photosensitizers and use thereof for generating hydrogen from water. N. Stefan, D. Uwe, B. Jens, H. Sascha, B. Matthias, Z. Horst-Werner, G. Felix, C. Daniela, D. Stefania, **G. Anilkumar**, L. Sebastian, J. Henrik, G. Serafino, B. Matthias World patent. **US 2014/0023582 A1.**
4. Photosensitizers and use thereof for generating hydrogen from water. N. Stefan, D. Uwe, B. Jens, H. Sascha, B. Matthias, Z. Horst-Werner, G. Felix, C. Daniela, D. Stefania, **G. Anilkumar**, L. Sebastian, J. Henrik, G. Serafino, B. Matthias World patent. **WO 2012/065833 A1.**
3. Photosensibilisatoren und deren Einsatz zur wasserstoffereugung aus wasser. N. Stefan, D. Uwe, B. Jens, H. Sascha, B. Matthias, Z. Horst-Werner, G. Felix, C. Daniela, D. Stefania, **G. Anilkumar**, L. Sebastian, J. Henrik, G. Serafino, B. Matthias European patent. **DE 10 2010044155 A1.**
2. Process for the Ruthenium catalysed Epoxidation of Olefins by means of Hydrogen peroxide. W. Magerlein, M. Beller, M. K. Tse, S. Bhor, M. Klawonn, **G. Anilkumar** US patent. **US 2006/0161011 A1.**
1. Verfahren zur Ruthenium-katalysierten Epoxidierung von Olefinen mit Wasserstoffperoxid. W. Magerlein, M. Beller, M. K. Tse, S. Bhor, M. Klawonn, **G. Anilkumar** European Patent. **DE 102005002821.**

Seminars conducted/participated (2013-2015)

Organized:

1. Third International Conference on Advanced Oxidation Processes (AOP 2014) 25-28 September, 2014 Munnar, Kerala (Organized)

2. National Colloquium on Recent Trends in Organic and Bioorganic Chemistry on 24th October, 2013 at Calicut University, Calicut, India

3. National Colloquium on Recent Trends in Organic and Bioorganic Chemistry on 18-20 July, 2014 at Kottayam, India

4. National Symposium on Transcending Frontiers in Organic Chemistry 2014 (TFOC 2014) at NIIST Trivandrum 9-11 October 2014 (Organized)

5. Workshop on Quantum Mechanics June 20-21, 2015 at Kottayam (Organized)

6. Workshop on Group Theory October 30-Nov1, 2015 at Kottayam (Organized)

Invited Presentation:

- Invited oral presentation at the National Colloquium on Recent Trends in Organic and Bioorganic Chemistry on 24th October, 2013 at Calicut University, Calicut, India

Proceedings-15

No. of Vacancies for Ph.D. : 2 (Only UGC-CSIR fellows should apply)