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### **Research Interests**

Organic Synthesis, Catalysis

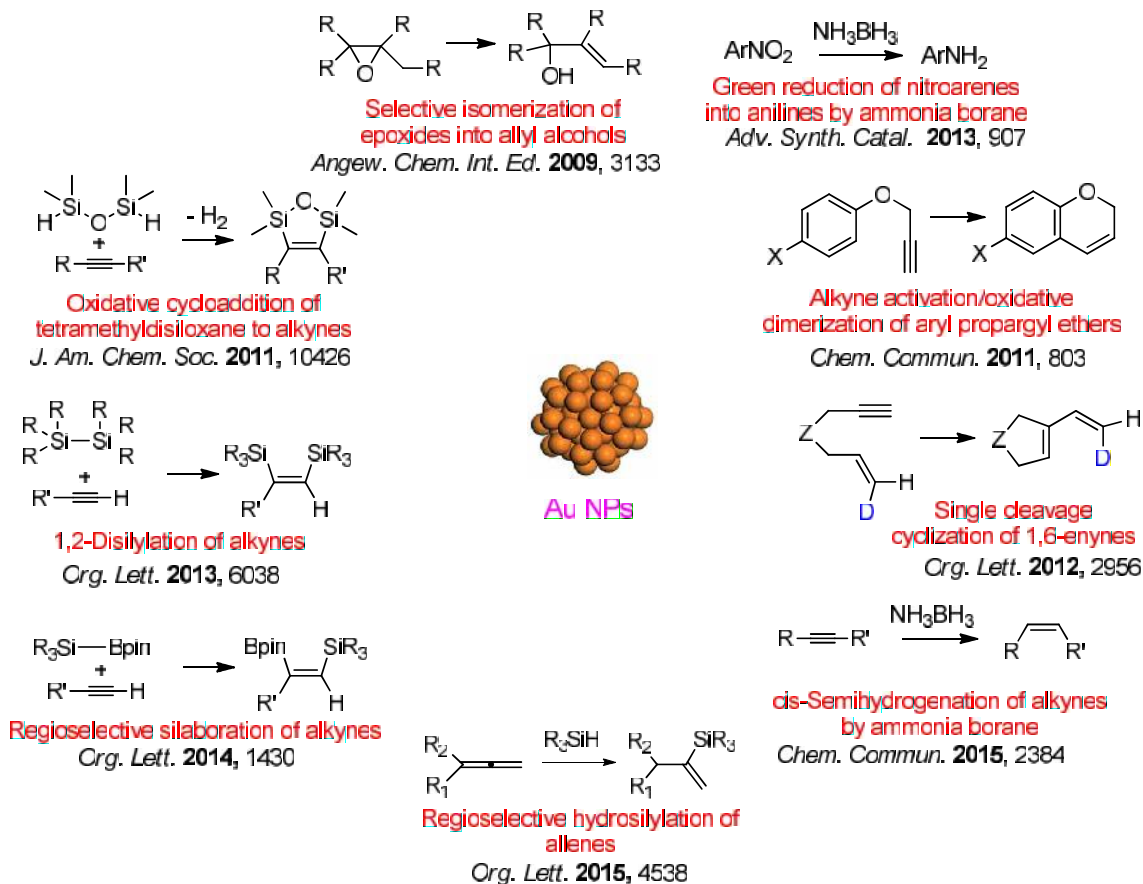
### **Brief Biography**

Manolis Stratakis, Professor, born in Crete, Greece; B.Sc. University of Thessaloniki, Greece (1986); Ph.D. in Chemistry, University of Crete, Greece (1991); Postdoctoral fellow, Univ. of California Berkeley with Prof. A. Streitwieser (1991-93), and Univ. of California Los Angeles with Prof. C. S. Foote (1995); Faculty of Chemistry, University of Cyprus (1997-1999); Faculty of Chemistry, University of Crete, Greece (1999-present); Author or co-author of over 85 original articles.

## Research Interests

### ● Catalysis of organic transformations by supported gold nanoparticles

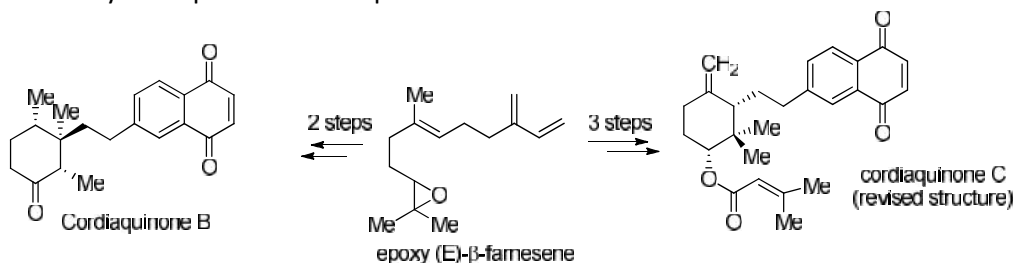
Gold nanoparticles supported on metal oxide surfaces is a unique, mild, and highly active heterogeneous catalyst for a variety and unprecedented organic transformations, including isomerization of epoxides into allylic alcohols, hydroarylation and 1,6-enyne cyclization through alkyne activation, the activation of hydrosilanes, disilanes, silylboranes and subsequent addition reactions to  $\pi$  systems or carbonyl compounds, activation of ammonia borane or amine borane complexes in reductive transformations (nitro compounds, alkynes), etc. A summary of some of the achievements of our lab in this field is schematically shown below:



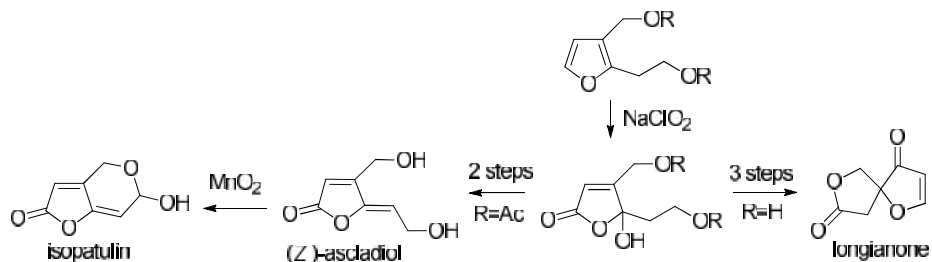
### ● Biomimetic natural product synthesis

Another area of investigation in our lab involves natural product synthesis employing bio-inspired scenarios.

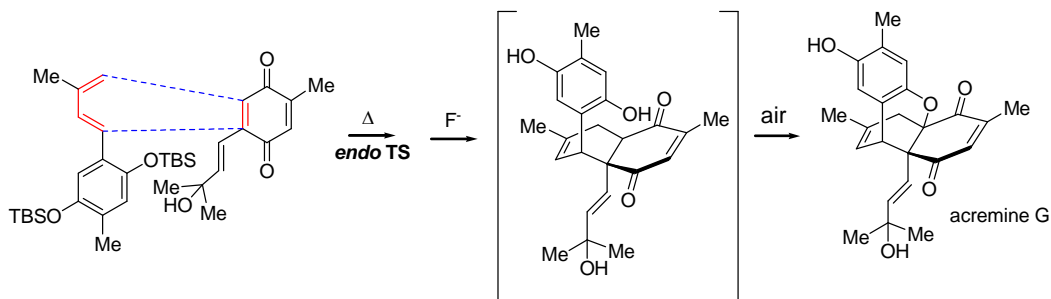
The synthesis of cordiaquinones B, C, J and K, was achieved using as a key-reaction the zeolite NaY-promoted biomimetic cyclization of epoxy (E)- $\beta$ -farnesene followed by an oxidative Diels-Alder reaction of the cyclized products with quinone.



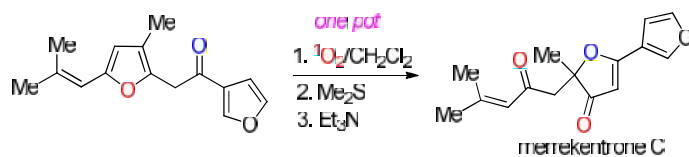
Longianone and the biosynthetically related mycotoxins isopatulin, and (Z)-ascladiol, were prepared following a divergent route from a readily available furan diol. The route towards longianone features an unprecedented TBAF-promoted intramolecular oxa-Michael reaction to a conjugated keto enoate, and the oxidation of dihydrolongianone to longianone with IBX. The route to isopatulin features a chemoenzymatic synthesis of (Z)-ascladiol, and the regioselective oxidation of (Z)-ascladiol to isopatulin.



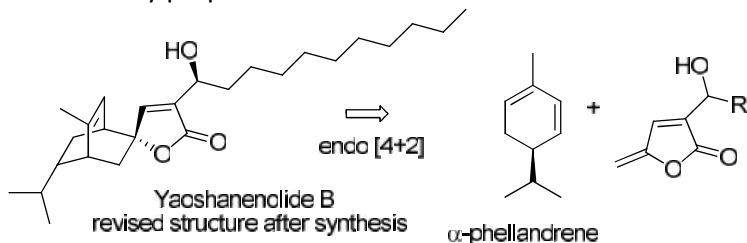
The dimeric metabolite acremine G was synthesized on the basis of a biogenetic scenario, featuring a highly regioselective and stereoselective Diels-Alder reaction between a TBS-protected hydroquinone diene and a structurally related alkenyl quinone. The major *endo* [4+2] adduct slowly transforms to acremine G by the atmospheric air under the deprotection conditions (HF).



Developing a new methodology for the synthesis of functionalized 3(2*H*)-furanones via photooxygenation of (β-keto)-2-substituted furans, we achieved the synthesis of sesquiterpene merrekentrone C.



(+)-Yaoshanenolide B was synthesized employing as a key step an *endo*-selective Diels-Alder reaction among a γ-methylene butenolide and α-phellandrene. The structure of natural product was revised to a diastereomer of the initially proposed one.



## Recent Representative Publications

1. Tsangarakis, C.; Arkoudis, E.; Raptis, C.; Stratakis, M. *Org. Lett.* **2007**, *9*, 583. "Selective monocyclization of epoxy terpenoids promoted by zeolite NaY. A short biomimetic synthesis of elegansidiol and farnesiferols B-D"
2. Arkoudis, E.; Stratakis, M. *J. Org. Chem.* **2008**, *73*, 4484. "Synthesis of cordiaquinones B, C, J and K on the basis of a bio-inspired approach, and the revision of the relative stereochemistry of cordiaquinone C"
3. Tsangarakis, C.; Raptis, C.; Arkoudis, E.; Stratakis, M. *Adv. Synth. Catal.* **2008**, *350*, 1587. "Zeolite NaY-promoted monocyclization of epoxy polyene terpenes: A unique route for the direct synthesis of incompletely cyclized naturally occurring terpenols"
4. Raptis, C.; Garcia, H.; Stratakis, M. *Angew. Chem., Int. Ed.* **2009**, *48*, 3133. "Selective isomerization of epoxides to allylic alcohols catalyzed by TiO<sub>2</sub>-supported gold nanoparticles"
5. Arkoudis, E.; Lykakis, I. N.; Gryparis, C.; Stratakis, M. *Org. Lett.* **2009**, *11*, 2988. "Biomimetic synthesis of dimeric metabolite acremine G via a highly regioselective and stereoselective Diels-Alder reaction"
6. Lykakis, I. N.; Zaravinos, I.-P.; Raptis, C.; Stratakis, M. *J. Org. Chem.* **2009**, *74*, 6339. "Divergent synthesis of the co-isolated mycotoxins longianone, isopatulin, and (Z)-ascladiol via furan oxidation"
7. Efe, C.; Lykakis, I. N.; Stratakis, M. *Chem. Commun.* **2011**, *47*, 803. "Gold nanoparticles supported on TiO<sub>2</sub> catalyse the cycloisomerisation/oxidative dimerisation of aryl propargyl ethers"
8. Lykakis, I. N.; Psyllaki, A.; Stratakis, M. *J. Am. Chem. Soc.* **2011**, *133*, 10426. "Oxidative cycloaddition of 1,1,3,3-tetramethyldisiloxane to alkynes catalyzed by supported gold nanoparticles"
9. Gryparis, C.; Lykakis, I. N.; Efe, C.; Zaravinos, I.-P.; Vidali, T.; Kladou, E.; Stratakis, M. *Org. Biomol. Chem.* **2011**, *9*, 5655. "Functionalized 3(2H)-furanones via photooxygenation of (β-keto)-2-substituted furans: Application to the biomimetic synthesis of merrekentrone C"

10. Gryparis, C.; Efe, C.; Raptis, C.; Lykakis, I. N.; Stratakis, M. *Org. Lett.* **2012**, *14*, 2956. "Cyclization of 1,6-enynes catalyzed by gold nanoparticles supported on TiO<sub>2</sub>: Significant changes in selectivity and mechanism as compared to homogeneous Au-catalysis"
11. Stratakis, M.; Garcia, H. *Chem. Rev.* **2012**, *112*, 4469. "Catalysis by supported gold nanoparticles: Beyond aerobic oxidative processes"
12. Gryparis, C.; Stratakis, M. *Chem. Commun.* **2012**, *48*, 10751. "Gold nanoparticles-catalyzed activation of 1,2-disilanes: Hydrolysis, silyl protection of alcohols and reduction of tert-benzylic alcohols"
13. Vasilikogiannaki, E.; Gryparis, C.; Kotzabasaki, V.; Lykakis, I. N.; Stratakis, M. *Adv. Synth. Catal.* **2013**, *355*, 907. "Activation of ammonia-borane complex by gold nanoparticles: Facile reduction of nitroarenes into anilines and nitroalkanes into hydroxylamines"
14. Gryparis, C.; Kidonakis, M.; Stratakis, M. *Org. Lett.* **2013**, *15*, 6038. "Supported gold nanoparticle-catalyzed cis-selective disilylation of terminal alkynes by  $\sigma$  disilanes"
15. Gryparis, C.; Stratakis, M. *Org. Lett.* **2014**, *16*, 1430. "Nanogold-catalyzed cis-silaboration of alkynes with abnormal regioselectivity"
16. Vasilikogiannaki, E.; Titilas, I.; Vassilikogiannakis, G.; Stratakis, M. *Chem. Commun.* **2015**, *51*, 2384. "cis-Semihydrogenation of alkynes with amine borane complexes catalyzed by gold nanoparticles under mild conditions"
17. Titilas, I.; Kidonakis, M.; Gryparis, C.; Stratakis, M. *Organometallics* **2015**, *34*, 1597. "Tandem Si-Si and Si-H activation of 1,1,2,2-tetramethyldisilane by gold nanoparticles in its reaction with alkynes: Synthesis of substituted 1,4-disila-2,5-cyclohexadienes"
18. Kidonakis, M.; Stratakis, M. *Org. Lett.* **2015**, *17*, 4538. "Ligandless regioselective hydrosilylation of allenes catalyzed by gold nanoparticles"
19. Kotzabasaki, V.; Vassilikogiannakis, G.; Stratakis, M. To be submitted. "Total synthesis and structural revision of (+)-yaoshanenolide B"