

# Prof. Sangho Koo

## Affiliation:

Department of Chemistry

Department of Energy Science and Technology

Myongji University

Myongji-Ro 116, Cheoin-Gu, Yongin, Gyeonggi-Do, 17058, Korea  
(ph) +82-31-330-6185; Fax) +82-31-335-7248

E-mail) sangkoo@mju.ac.kr Home) <http://www.kooslab.org>



## Education

1981.3~1985.2: **BS**, Seoul National University, Chemistry Major

1986.1~1987.5: **MS**, The University of Michigan, Organic Chemistry

1988.9~1992.8: **Ph. D.** The University of Michigan, Organic Chemistry

1992.09~1994.02: Postdoctoral Fellow, Emory University

## Professional Career

1994.03~present: Professor in Chemistry, *Myong Ji University*

2006.02~present: Special Visiting Professor, Chemical Biotechnology, School of Pharmacy,  
*East China University of Science and Technology*, Shanghai, China

2006.03~2013.02: Professor in Nano Science and Engineering, *Myongji University*

2013.03~present: Professor in Energy Science and Technology, *Myongji University*

2017.02~present: Dean of Natural Science, *Myongji University*

2018.01~present: Vice-editor-in-chief, *Journal of the Korean Chemical Society*

## Research Areas

1. Development of Efficient Cyclization Methods: Efficient synthetic methods for five-, six-, and seven-membered rings have been developed, and the syntheses of polycyclic structures using those compounds are under investigation. We are currently working on the Mn(III)-catalyzed oxidative hetero-aromatic cyclization for the syntheses of furan, pyrrole, and indole.
2. Chemistry of Isoprenoid: Isoprenoid can be classified into terpenoid, carotenoid, and steroid. We have developed various bi-functionalized C<sub>5</sub> prenyl units that can be efficiently used in the chain-extension processes for making various isoprenoid natural products. We adopted the Julia Sulfone protocol in C–C bond formation, which would give polyprenyl or polyene structures depending on the sulfone elimination process. Carotenoid natural products have been nicely assembled using our C<sub>10</sub> bis(chloroallylic) sulfide or C<sub>10</sub> dialdehyde. We extended this strategy to make other important carotenoid compounds. We further pursue the synthesis of terpenoid and steroid

compounds by the combined use of our cyclization and chain-extension strategies. Followings are the carotenoid compounds that we have made or have been making now: Vitamin A, Tretinoin, Isotretinoin, Tocoretinoate,  $\beta$ -carotene, Lycopene, Lycophyll, Nor-Bixin, Crocetin, Zeaxanthin, Astaxanthin, Canthaxanthin, Coenzyme Q-10.

3. Conducting Molecular Wires: Based on our methods of the carotenoid synthesis, we are able to construct the conjugated polyene chains with variable lengths. This conjugated polyene chains, which conduct electrons, can be stabilized by attaching phenyl substituents to the chain. We are preparing various organic conducting wires with different resistances. We are going to build up various molecular electronic circuits with diverse conductance.
4. Biomass conversion: Efficient conversion methods of sugars into useful platform chemicals such as 5-hydroxymethylfurfural (5-HMF) and 5-hydroxymethylpyrrole-2-carbaldehydes (pyrralines) are being investigated. A bis(sulfonic acid)-ionic liquid was utilized for fructose conversion to 5-HMF. The optimal condition using DMSO and oxalic acid transformed glucose with primary amines into pyrralines. This one-pot conversion of sugars into pyrralines is being applied to the total synthesis of biologically active natural products, (-)-Hanishin, Lobechine, and Magnolamide.

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2. "Microbial Deoxygenation of *N*-Oxides with Baker's Yeast-NaOH" W. Baik,\* D. I. Kim, S. Koo, J. U. Rhee, S. H. Shin, B. H. Kim, *Tetrahedron Lett.* **1997**, *38*, 845-848.
3. "Highly Efficient Synthesis of Methyl-Substituted Conjugate Cyclohexenones" B.-D. Chong, Y.-I. Ji, S.-S. Oh, J.-D. Yang, W. P. Baik, S. Koo,\* *J. Org. Chem.* **1997**, *62*, 9323-9325.
4. "Chemoselective Reactions of Anthrone with  $\alpha,\beta$ -Unsaturated Ketones" W. Baik,\* C. H. Yoon, K. C. Lee, H. J. Lee, S. Koo, J. Kim, B. Yoon, H. Kim, *J. Chem. Res.* **1998**, 358-359.
5. "LiAlH<sub>4</sub> Promoted Reductive Deoxygenation of Hydroxybenzyl Alcohols via Benzoquinone Methide Intermediates" W. Baik,\* H. J. Lee, S. Koo, B. H. Kim, *Tetrahedron Lett.* **1998**, *39*, 8125-8128.
6. "Photostimulated Reductive Cyclization of *o*-Nitrophenylazo Dyes Using Sodium Hydroxide in Isopropyl Alcohol. A New Synthesis of 2-Aryl-2H-benzotriazoles" W. Baik,\* C. H. Yoo, S. Koo, H. Kim, Y. H. Hwang, B. H. Kim, S. W. Lee, *Heterocycles* **1999**, *51*, 1779-1783.
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11. “Selective Oxidation of Allylic Sulfides by Hydrogen Peroxide with Trirutile-type Solid Oxide Catalyst - LiNbMoO<sub>6</sub>” S. Choi, J.-D. Yang, M. Ji, H. Choi, M. Kee, K.-H. Ahn, S.-H. Byeon, W. Baik, S. Koo,\* *J. Org. Chem.* **2001**, *66*, 8192-8198.
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23. “Stereoselective and Convergent Syntheses of Retinoic Acid and Its Ester Derivatives by the Sulfone Olefination Reaction” H.-S. Jeon, J. E. Yeo, Y. C. Jeong, S. Koo,\* *Synthesis* **2004**,

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- Terpenoids” Z. Li, H. Jung, M. Park, M. Lah, S. Koo,\* *Adv. Synth. Catal.* **2011**, 353, 1913-1917.
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46. “Resonance Raman Spectra of Carotenoid Molecules: Influence of Methyl Substitutions” M. Macernis,\* D. Galzerano, J. Sulskus, E. Kish, Y.-H. Kim, S. Koo, L. Valkunas, B. Robert, *J. Phys. Chem. A* **2015**, 119, 56-66.
47. “Regioselective Synthesis of 1,3- and 1,2-Tocopheryl Glyceride Ethers of Carboxylic Acids” B. S. Choi, J. Choi, S. Bak, S. Koo,\* *Eur. J. Org. Chem.* **2015**, 514-524.
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## Book

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2. *Science of Synthesis*, Thieme, 2009: Vol. 45.30 Conjugated Polyenes.
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## Patents

### 32 Korean Patent Registration

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