Mercoledì **14 Maggio 2025, ore 17:00**
aula A del DiSC

il **Prof. Jeffrey Pyun**

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terrà un seminario dal titolo:

Polymerizations with Elemental Sulfur and Sulfur Petrochemicals for High Performance Commodity Plastics

Abstract: Polymerizations with elemental sulfur (S_8) has recently emerged as an important area of polymer chemistry and sustainability.[1] A major advance in this area was the discovery of *inverse vulcanization* by Pyun et al. in 2013[2] which uses molten elemental sulfur as a monomer and bulk medium for free radical polymerizations with unsaturated organic comonomers to prepare high sulfur content polymers possessing useful electrochemical, optical, adhesive and chemical scavenging properties.[12-15] ***We will discuss recent efforts on the development of commodity plastics from sulfur derived prepolymer resins, thermoplastic elastomers and flame retardant polymers as route to create high value products using elemental sulfur.*** While the development of inverse vulcanization has been a major breakthrough in this field, the poor miscibility of numerous organic monomers in liquid sulfur, along with the high temperatures required for this process, limited the scope of polymers that can be prepared. Hence, we will also discuss ***our recent work with alternative monomer feedstocks from elemental sulfur, namely, sulfur monochloride (S_2Cl_2)*** for synthesis of inexpensive, high performance polymeric materials. We report on a ***new process termed, sulfenyl chloride inverse vulcanization (SC-IV), which is a next generation advance over the inverse vulcanization of S_8 and offers unprecedented control of polymer molar mass, architecture and composition.*** This is the first step- growth addition polymerization of S_2Cl_2 with olefinic monomers to afford high molar mass linear thermoplastics and optically transparent thermoset materials. New polymers from this process are anticipated to afford a new class of commodity optical plastics that distinct optical figures of merit over state-of-the-art commodity optical polymers, such as PMMA, or polycarbonate.

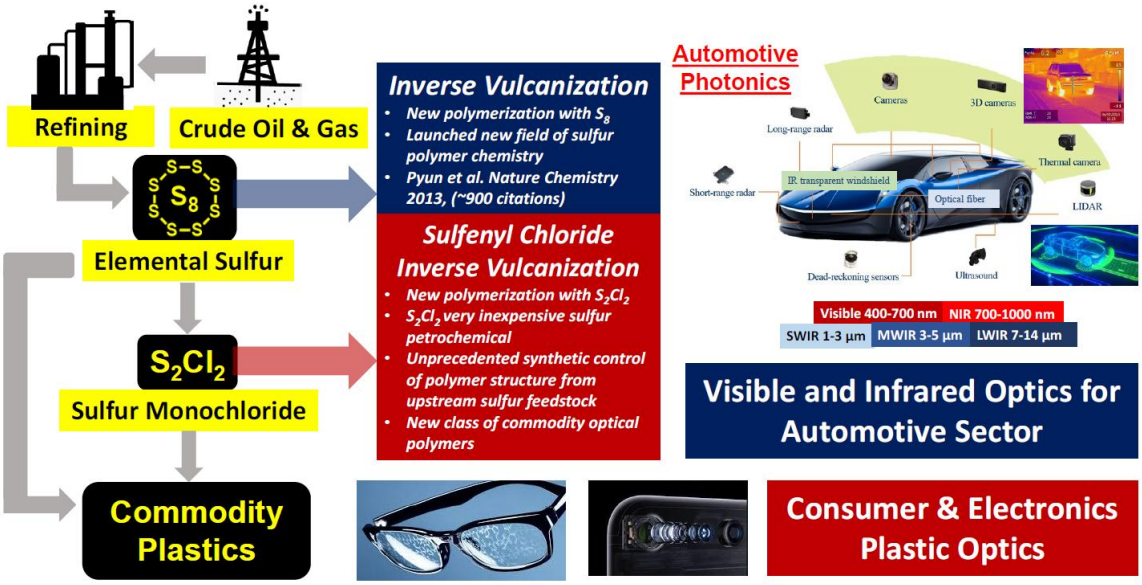
References

1. “The Use of Elemental Sulfur as an Alternative Feedstock for Polymeric Materials,” Chung, W.-J.; Griebel, J.J.; Kim, E.-T.; Yoon, H. –S.; Simmonds, A.G.; Jon, H.-J.; Dirlam, P.T.; Wie, J.J.; Nguyen, N.A.; Guralnick, B.W.; Park, J.-J.; Somogyi, A.; Theato, P.; Mackay, M.E.; Glass, R.S.; Char, K.-C.; Pyun, J. *Nature Chemistry* **2013**, *5*, 518-524

2. “Recent Synthetic and Processing Approaches for the Direct Use of Elemental Sulfur for Advanced Materials,” Lee, J.; Pyun, J.; Char, K. *Angew. Chem. Int. Ed.* **2015**, *54*, 3249-3258. (Review paper)

3. “Polymerizations with Elemental Sulfur: A Novel Route to High Sulfur Content Polymers for Sustainability, Energy and Defense,” Griebel, J.J.; Glass, R.S.; Char, K.; Pyun, J. *Prog. Polym. Sci.* **2016**, *58*, 90-125. (Review paper)

4. “Polymerizations with Elemental Sulfur: From Petroleum Refining to Polymeric Materials,” Lee, T.; Dirlam, P.D. Njardarson, J.T.; Glass, R.S.; Pyun J. *JACS* **2022**, *144*, 5-22 (Review paper)



La presenza della S. V. sarà molto gradita

Prof. Edmondo M. Benetti

Biography

Jeffrey Pyun

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Professor Jeffrey Pyun is currently a Professor in the Department of Chemistry & Biochemistry and a Professor in the Wyant College of Optical Sciences at the University of Arizona. Prof. Pyun's research interests focus on the synthesis, self-assembly, characterization and device evaluation of novel polymers, nanoparticles, and nanocomposites materials. He is currently working on materials that are anticipated to broadly impact the areas of optical polymeric materials, photonics, sustainable polymer chemistry, sulfur utilization, photocatalysis-solar fuels and energy storage technologies. In 2002, he obtained his Ph.D. in Chemistry with **Prof. Krzysztof Matyjaszewski** at *Carnegie Mellon University* working in the area of controlled radical polymerization applied to the synthesis of organic/inorganic hybrid materials. He then moved on to postdoctoral research in a joint position with **Prof. Jean M.J. Fréchet** and **Prof. Craig J. Hawker** at the *IBM Almaden Research Center* from 2002-2004 focusing on the synthesis of complex macromolecular architectures for catalysis. Since 2009, he has also served as a *World Class University Professor and Adjunct Professor*, in the School of Chemical & Biological Engineering at Seoul National University. Prof. Pyun's research contributions have been recognized by a number of prestigious awards for young investigators, namely, the National Science Foundation CAREER Award (2007), the Office of Naval Research Young Investigator Award (2007), the IBM Faculty Award (2007), the Alfred P. Sloan Foundation Research Fellowship (2009) and for important contributions to the magnetic tape industry thru the Information Storage Industry Consortium (INSIC) Technical Achievement Award (2009). He has also been recognized by the University of Arizona with the Innovation and Impact Award from Tech Launch Arizona and was named the Academic Innovator of the Year in 2017 from the State of Arizona. He was also appointed as a Kavli Fellow (2011), an American Chemical Society PMSE Fellow (2019), admitted into the National Academy of Inventors (2019) and named a Fellow of the Royal Society of Chemistry (2021). Prof. Pyun was recently named the first recipient of the University Distinguished Innovation and Entrepreneurship Award from the University of Arizona (2022). Prof. Pyun is also an Adjunct Professor to the faculty at Pusan National University in the Department of Chemistry and a Visiting Professor, Adjunct Professor at Korea University in the Department of Chemical Engineering since 2020 and Visiting Professor in the College of Engineering at Hanyang University.