New NLO Materials: Design, Synthesis, and Crystal Growth

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Chemistry Seminar on *Non-Linear Optical Materials*

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Abstract: Nonlinear optical (NLO) materials are critical in generating coherent light through frequency conversion, e.g., second harmonic generation (SHG). From the ultraviolet (UV) to the infrared (IR), NLO materials have expanded the range of the electromagnetic spectrum accessible by solid-state lasers. Wavelengths where NLO materials are still needed include the UV (~200 - 400nm) and deep UV (< 200nm). Coherent deep-ultraviolet (DUV) light has a variety of technologically important uses including photolithography, atto-second pulse generation, and in advanced instrument development. Design strategies will be discussed, as well as synthetic methodologies. In addition, the crystal growth, characterization, and structure-property relationships in new UV and DUV NLO materials discovered in our laboratory will be presented. Finally, our crystal growth capabilities and recent crystal growth of functional materials will be described.

About the speaker: Prof. P. Shiv Halasyamani earned his B.S. in Chemistry from the University of Chicago (1992), and his Ph.D. in chemistry under the supervision of Prof. Kenneth R. Poeppelmeier at Northwestern University (1996). He was a post-doctoral fellow and Junior Research Fellow at Christ Church College, Oxford University from 1997-1999. He began his independent academic career in the Department of Chemistry at the University of Houston in 1999, and has been a full professor since 2010. He was elected as a fellow of the American Association for the Advancement of Science (AAAS) in 2019, and a Fellow of the Royal Society of Chemistry (FRSC) in 2023. Shiv has won a number of awards since starting his academic career including a NSF Career Grant, Exxon-Mobil Solid-State Award, Beckman Young Investigator, Roy-Somiya Award: International Solvothermal and Hydrothermal Association, High-End Foreign Experts Project Award - CAS PRC, Future Science & Technology Lecturer - Technical Institute of Physics and Chemistry, CAS PRC, and Distinguished Visiting Project Professor - Kyoto University.

Shiv is currently an Associate Editor of the ACS journals Inorganic Chemistry and ACS Organic & Inorganic Au, as well as the Graduate Chairman in the Department of Chemistry. He has published over 250 peer-reviewed papers with an h-index of 64 and nearly 14,000 citations. His research interests involve the design, synthesis, crystal growth, characterization, and structure-property relationships of new functional inorganic materials.