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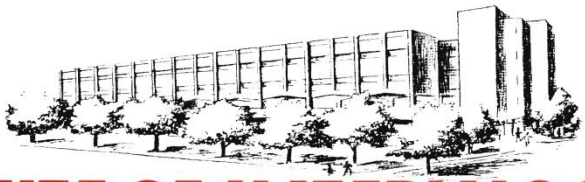

INSTITUTE OF MATERIALS SCIENCE

POLYMER PROGRAM SEMINAR

"New Facility for and Advances in Tetrafluoroethylene (TFE)-based Fluoropolymers"

Prof. Joseph Thrasher
Clemson University

Friday, April 8, 2016
11:10 AM, IMS Room 20

ABSTRACT

With the availability of our improved barricade facility for working safely with tetrafluoroethylene (TFE) on the kilogram scale [1], we have undertaken a number of projects in the area of TFE-based co- and ter-polymers. In the area of amorphous fluoropolymers, we have successfully synthesized 2,2,5,5-tetrafluoro2,5-dihydrofuran and co-polymerized it with both TFE and hexafluoropropene (HFP). The preparation and characterization of these polymers as well as some new chemistry of 2,2,5,5-tetrafluoro2,5-dihydrofuran will be presented, including the crystal structures of several products resulting from the chemistry of this monomer. We continue to prepare sulfonamide ionomers [2] by both the DesMarteau method as well as by the derivatization of co-polymers of TFE and perfluorosulfonyl fluoride-(PFSF) functionalized trifluorovinyl ethers (TFVE), such as those used in Nafion® and Aquivion®. The co-polymerization kinetics of TFE with these PFSFfuntionalized TFVE monomers as well as with vinylidene difluoride (VDF), chlorotrifluoroethylene (CTFE), and trifluoroethylene (TrFE) have been studied both in the presence and absence of gaseous carbon dioxide (CO2). We have also been learning how to prepare perfluoroalkoxy (PFA) resins of commercial quality, so that we might study the incorporation of a ter-monomer aimed at improving the properties of the PFA resin, such as mechanical strength and wearability. The results from these and related studies will be presented.

**See references on the following page*

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4. Z.-W. Yang, M. Gummalla, Y. Hosokawa, J. S. Thrasher, T. S. Sayler, A. Matsnev, R. E. Fernandez, A. Waterfeld, *Method of Fabricating an Electrolyte Material*, WO Patent 2014098907 A1, June 26, 2014.

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