

Department of Chemistry Seminar Series – Fall 2020

Composites of Polymer Derived Ceramics

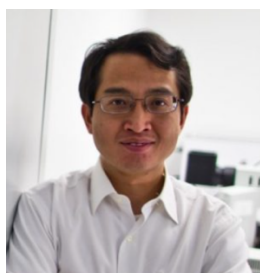
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Host: Prof. Fernando Uribe-Romo

September 28, 2020 10:00 AM – Zoom

Meeting Room: <https://ucf.zoom.us/j/93288025119> Passcode: 747805



Polymer derived ceramics (PDCs) are a class of ceramics synthesized by a thermal decomposition of polymeric precursors. Their unique nanostructures grant attractive properties including low density, excellent high-temperature thermo-mechanical properties, high piezoresistivity and chemical/thermal stability. The polymer-to-ceramic process allows the introduction of various functional materials into ceramics, and enables the fabrication of complex shaped components and devices with hybrid processing/shaping technologies. In this presentation, the fabrication and the properties of the composites of PDCs of graphene and metal nanoparticles will be discussed. The incorporation of anisotropic graphene aerogels in PDC enabled the production of bulk ceramic samples of anisotropic properties and increased the electric conductivity by more than nine orders of magnitude. Metal nanoparticles were synthesized on PDC fibers by the pyrolyzing electrospun fibers made from the solutions of polyacrylonitrile (PAN, carbon source), oligosilazane (preceramic polymer), and common metal salts (metal sources). In addition, PDC nanoparticles have been used with graphene as anode materials for lithium ion batteries and demonstrated much higher capacity than graphite anodes.