MSE SEMINAR

April 7, 2017
113 McBryde Hall
3:30 – 4:30 PM
Refreshments at 3:00 PM

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"Effects of Additives and Pyrolysis Atmosphere on Porous SiOC Ceramics"

ABSTRACT

Silicon oxycarbide (SiOC) is a polymer derived ceramic consisting of SiO_2 nanodomains, turbostratic carbon, and SiC crystallites. Porous SiOC has shown great promise for applications such as lithium ion battery anodes, gas separation membranes, and catalyst supports. The properties and microstructure of the SiOC heavily depend on the polymer precursor and the processing conditions. This study fabricated bulk SiOC using a base polysiloxane (PSO) system with different organic additives to change the initial polymer chemistry. The polymers were then pyrolyzed to 1400°C in either Ar or Ar+H_2O atmospheres to influence the polymer-to-ceramic conversion. Etching the resulting SiOC with hydrofluoric acid removes the SiO_2 nanodomains, producing micro- and mesopores with the same size and concentration as the etched SiO_2 phase. Lowering the carbon content of the polymers was found to slightly increase the pore size and hence the SiO_2 size. Pyrolysis with the Ar+H_2O atmosphere produced a higher concentration of SiO_2 in the SiOC, resulting in a significant increase in specific surface areas, pore volumes, and pore sizes after etching.

BIOSKETCH

Donald Erb is currently pursuing his M.S. degree in Materials Science and Engineering at Virginia Tech, advised by Dr. Kathy Lu. He received his B.S. in MSE from Virginia Tech in 2015. His research involves the processing and characterization of porous polymer derived ceramics.