

## Foams from Lignin

David P. Harper, Rohit Uppal, and Omid Hosseinaei

Center for Renewable Carbon, The University of Tennessee

### Abstract

The carbon foams currently derive from petroleum and coal and have many uses for heat management, batteries, conductors, and insulators. However, they are cost prohibitive for many applications. We propose use of new low cost carbon foams made from lignin. Our new method uses low molecular weight components with and without addition of blowing agents to make lignin foams. The foam is formed under pressure (0.69 – 2.76 MPa) and heat (up to 250°C) without additional need of an oxidation step allowing for further process savings. Select foams were carbonized to an ultimate temperature of 1000°C. Foams made by this method possess an open cell structure of different pore sizes and densities (0.1 – 0.7 g/mL) depending on process conditions and highly dependent on lignin feedstock (switchgrass, hardwood, or softwood). Interestingly, switchgrass lignins foamed most readily and stabilized very quickly, while possessing low density. The foam morphology and property dependence on feedstocks and processing condition will be discussed.