

# Characterization of polyimide stock shape made from powder

Shima Dayarian<sup>1</sup>, Liu Yang<sup>1</sup>

<sup>1</sup>*University of Strathclyde, Department of Mechanical and Aerospace Engineering, 75 Montrose Street, Glasgow, G1 1XJ, United Kingdom*

Email: s.dayarian@strath.ac.uk

Polyimide (PI) aerogel has excellent thermal and mechanical properties that results in a variety of applications specially in insulation area. Producing the PI stock shape is expensive such that it greatly limits the application of this material. In this study, the epoxy was used as a binder to convert the powder to stock shape instead of making the PI stock shape directly in order to reduce the cost. In terms of filling the pores before adding the epoxy, water was added. In order to investigate the method, different concentration of epoxy was used as a binder. 1inch rectangular aluminum mold was applied and molded PI - Epoxy samples were cured at 80 °C. Compression test shows that by adding 5 wt% of epoxy into PI powder the compressive stress is raised 13% at 10% strain. It is found that for PI with binder the temperature at 10% decomposition is decreased. As the porosity of the PI aerogel is dropped due to adding the epoxy, its mechanical properties are increased. The size distribution results are obtained from nitrogen adsorption test show that for binder sample the majority of pores are mesopores and in some concentration of epoxy the macropores are made in the range of 50-76 nm. In comparison with other type of PI aerogel in the literature, these samples have low surface area which is less than 20 m<sup>2</sup>/g. In general, the PI stock shape made from powder has competitive properties.

## **Acknowledgements:**

We would like to express great gratitude to our industry partner, Blueshift Materials, for their strong support.