Additive Manufacturing of Hybrid Silicon Carbide/Carbon Fiber Composites

Saja M. Nabat Al-Ajrash*, Charles Browning*, Rose Eckerle*, Li Cao*
Department of Chemical and Materials Engineering, University of Dayton
saja.alajrash@icem.edu.om

Motivation

- Additive manufacturing, AM, has the potential to reduce the cost, weight and long lead times of a variety of components critical to Air Force applications
- Hybrid ceramic materials have the potential of performance in extreme environments
- A major challenge will be microstructure – identifying and ultimately controlling key microstructure-property-process relationships

Objective

- Develop formulations and process parameters for yielding an "AM printable" hybrid SiC/C composite using available materials and printers

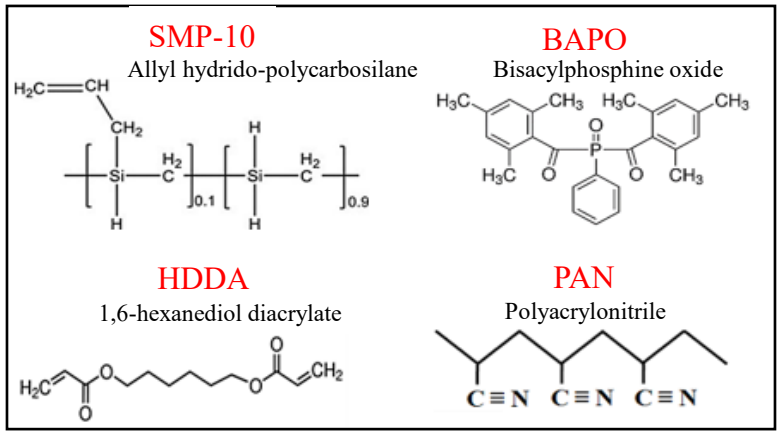

Fig 1: Materials.

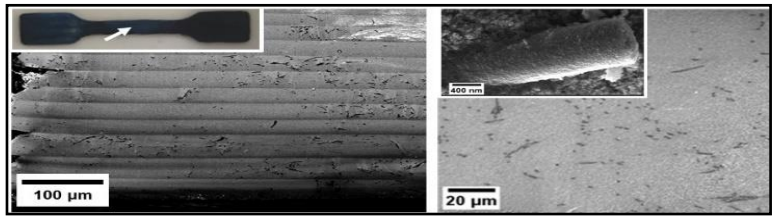

Fig 3: SEM images of pyrolyzed 2% Cf.

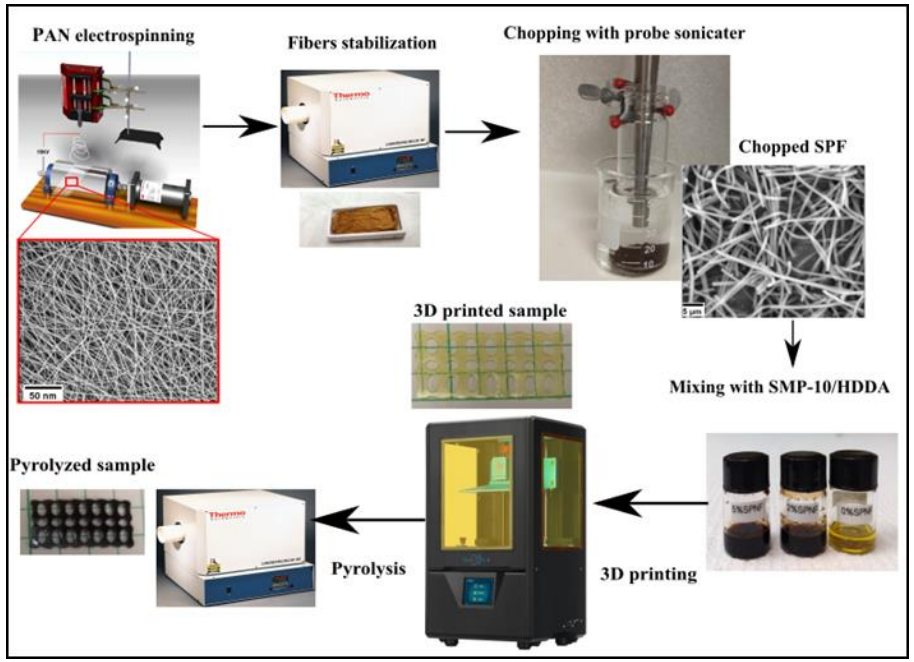

Fig 2: Experimental procedure

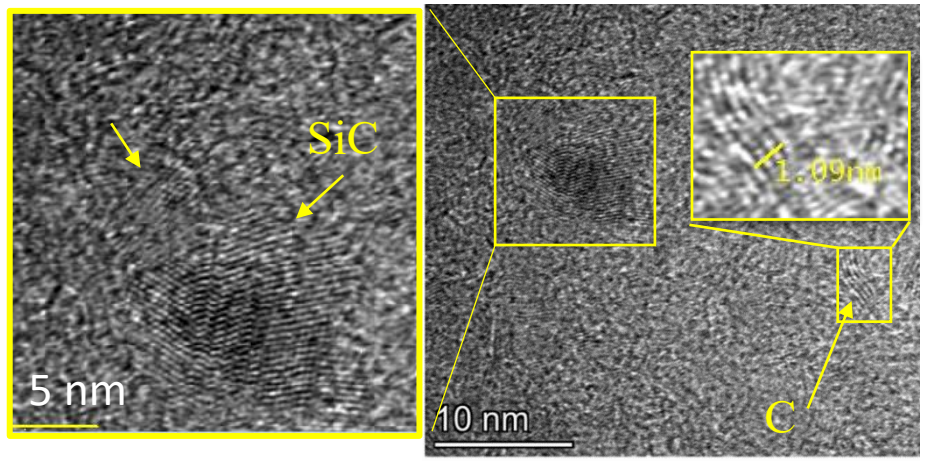

Fig 4: Matrix lattice fringes of turbostratic carbon and SiC phases

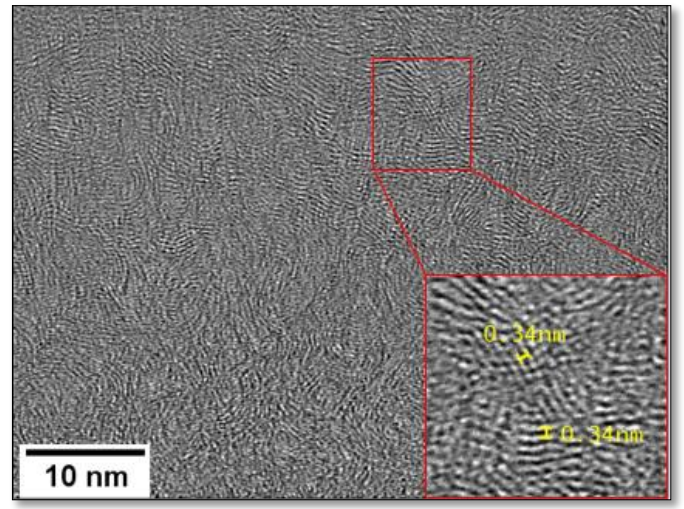

Fig 5: Carbon fiber lattice imaging

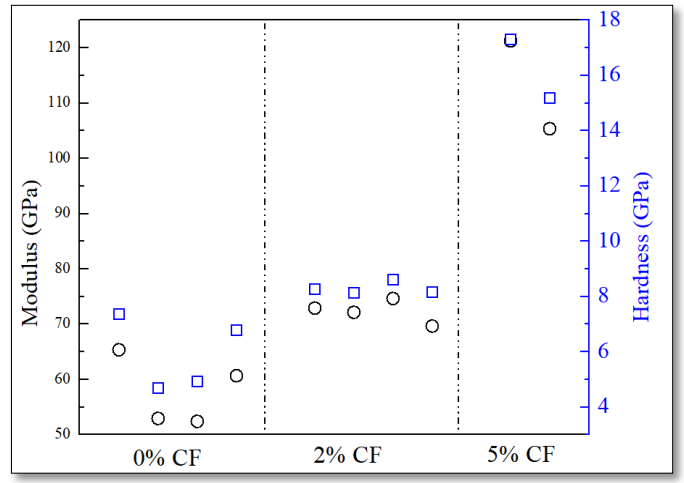

Fig 6: Nanoidentations

Acknowledgement: This effort is supported by AFOSR Grant FA9550-18-1-0274Thanks to Drs. Goretta and Pan for their support of this program