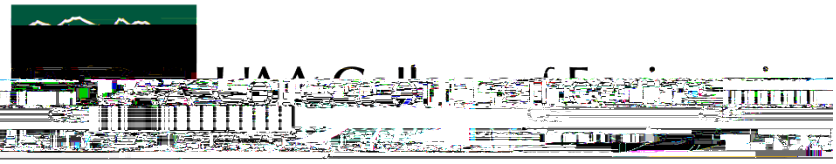

Functional polymer composites are a highly-demand class of materials with enormous applications in electronics, aerospace & defense, transportation, and energy segments. They offer unique combinations of characteristics, including high specific mechanical properties, tunable conductivity, permittivity, piezoresistivity, etc., that are otherwise unachievable. Significant research is being conducted to develop advanced manufacturing technologies and novel material systems that can advance this multidisciplinary field and deliver sustainable and cost-effective products with enhanced performance for existing and emerging applications. This talk will cover two important manufacturing processes of polymer composites: injection molding as the most widely adapted process, and fused filament fabrication as the fastest growing process. First, foam injection molding of conductive polymer composites is presented with a focus on the process optimization and process-structure-property relationships in composites for electromagnetic interference shielding and charge storage applications. The composites based on carbon nanotube, carbon fiber, and steel fiber will be discussed. The second part focuses on the additive manufacturing of functional polymer nanocomposites. The development of 3D-printed carbon nanotube composites for strain, liquid, and contact sensing applications, as well as methods to measure the intralayer adhesion and fracture resistance in additively manufactured polymers will be presented. The multimaterial printing and multidirectional sensing capabilities will also be discussed.

is an Assistant Professor at the School of Mechanical and Materials Engineering at the Washington State University Tri-Cities. He is the founder and director of the Advanced Composites Laboratory, which focuses on the development of novel composite systems and advanced manufacturing methods to generate high-performance multifunctional materials and structures. His recent projects are concerned with the development of 3D printed nanocomposites for strain, liquid, and proximity sensing applications. D Q0.1 13.6ef q0.tes fiber