

# Séminaire du laboratoire PIMM

Jeudi 21 octobre 2021 à 13h30 en Amphi Pinel

**Prof. Fayme KEIST**

Applied Research Laboratory at Penn State University

présentera dans le cadre du séminaire ses travaux intitulés :

## **Additive Manufacturing of Metal based Functionally Graded Materials**

Functionally graded materials (FGMs) contain two (or more) material systems within a single component and exhibits a chemistry and/or microstructural gradient within the component. FGMs can help address emerging engineering needs for extreme and corrosive environments by selectively harnessing desired chemistry, microstructures and thus resulting properties. The layer-by-layer deposition inherent to additive manufacturing (AM) has opened this processing technology as a new tool for producing large FGMs that would be difficult to produce using traditional methods such powder sintering and centrifugal casting. Directed energy deposition (DED) is an AM processing technology that allows for direct and precise control of the chemical and microstructural gradient across the component to better harness the desired properties within the final component. This presentation will highlight process planning and control required for producing FGMs using DED additive processes. This process control framework was used to produce a high strength steel (AF9628) to stainless steel (316L) FGM by laser based DED, however, defects such as solidification cracking within the gradient were observed. The difficulties of producing FGMs even with a process control framework highlights the unique challenges of building FGMs using DED. In addition, these difficulties highlights the need of understanding the impact of varying chemistry on the processing behavior of the material during DED deposition.