



Minority University Research and Education Project (MUREP)

Institution: San Diego State University

City/State: San Diego, CA

Award Name: MUREP Partnership Learning Annual Notification (MPLAN)

Award Number: N/A

Title: Enhanced Aero-Composites: Reinforcement Innovation/ STTR: T12.09 Thermoplastic Composites for Repurposable Aerospace Applications

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Award Fiscal Year: FY2024

Summary:

Thermoplastic composites offer a promising alternative to traditional metal alloys in aerospace engineering, providing superior strength-to-weight ratios & reshaping capabilities. However, their susceptibility to brittleness under high-impact conditions poses a challenge to widespread adoption. Our proposal seeks to overcome this obstacle by enhancing the toughness & impact resistance of thermoplastic composites through the incorporation of Metal Matrix Composites (MMC) & Ceramic Matrix Composites (CMC). By fortifying the mechanical performance & durability of these composites, we aim to expand their use in aerospace and high-performance environments. We propose integrating carbon-reinforced nanocylinders of MMC or CMC materials into the thermoplastic matrix to strengthen its toughness & resilience. Through meticulous matrix modifications, we will ensure uniform dispersion of the reinforcing materials & robust interfacial bonding while minimizing degradation during processing. This innovative approach promises significant advancements in the mechanical integrity and reliability of thermoplastic composites, opening new opportunities for their utilization in various aerospace sectors.