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Electronic and Mechanical Properties of MXene-Modified Carbon-Based Composites

Abstract.

Two-dimensional transition metal carbides and nitrides, known as MXenes, are a new class of materials that are finding numerous applications ranging from energy storage and electromagnetic interference shielding to water purification and antibacterial coatings. Recent measurements of individual crystals of $Ti_3C_2T_x$, the most well studied MXene, which were performed by the PI of this proposal, revealed the unique combination of exceptional electronic and mechanical properties. The team of investigators intends to employ these properties in ultrastrong conductive fibers. The goal of this project is to create a new class of composite materials comprising carbon nanofibers reinforced with MXene sheets. These fibers are expected to exhibit improved mechanical properties and electrical conductivity, which will make them relevant for a broad range of mechanical and energy storage applications.