DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

PhD Thesis Proposal

MXene Coating Strategies for Multiscale Textiles and Their Diverse Applications

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Abstract

There has been significant interest and extensive effort in integrating MXenes into textiles, leveraging MXenes' advantageous properties and ease of processing. However, most existing methods for applying MXenes to textiles are slow, expensive, and result in lower electrical conductivity compared to when MXenes are coated on films. To address these issues, this thesis aims to optimize MXene coatings on textile substrates, enhancing the electrical, mechanical, and optical performance of the coatings, while reducing MXene usage and boosting process efficiency. The goals are set to be accomplished by optimizing and judiciously selecting coating techniques, MXene formulations, and textile substrates at the fiber, yarn, and fabric levels, to enhance the distribution, alignment, and infiltration of MXene flakes in textiles. Through this enhanced approach, this thesis also seeks to demonstrate novel functionalities of MXene-functionalized textiles, expanding their applications in smart textiles and beyond.