DREXEL UNIVERSITY
Materials Science and Engineering
College of Engineering

Department of Materials Science and Engineering,

MS Defense

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MXene-Polymer Nanocomposites *via* Thiol-Based "Click" Chemistry

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Abstract

A process for easily fabricating thiol-acrylate and thiol-isocyanate based nanocomposites with well-dispersed two-dimensional titanium carbide ($Ti_3C_2T_z$) was explored. $Ti_3C_2T_z$ MXene produced using the LiF/HCl "clay" method and multilayer $Ti_3C_2T_z$ etched with 10wt. % HF were dispersed in monomer solutions, which were then cured with the highly efficient thiol "click" reactions to form composites. A method for treating HF-etched MXene with isocyanates to improve the dispersion of MXene in the polymer matrix was developed. The efficacy of the surface treatment was measured using diffractive and spectroscopic methods. Synthesized MXene-polymer nanocomposites were investigated for their mechanical and thermal properties over a range of filler concentrations.