Stable Colloidal Dispersion of Octylated Ti_3C_2-MXenes in a Nonpolar Solvent

임세형, 박현수, 양지원, 곽채수, 이주형†
명지대학교
(ljbro@mju.ac.kr†)

Two-dimensional (2D) early transition metal carbides and/or nitrides (MXenes) have shown significant potential in a wide variety of applications. The majority of MXene research has utilized aqueous colloidal dispersions of MXenes because of the unique hydrophilicity of the MXene surface. In some cases, however, aqueous dispersions have various disadvantages such as the degradation of MXenes in long-term storage, incompatibility with water-insoluble polymers, and dewetting on low-surface-energy substrates. Herein, we demonstrated a stable nonpolar colloidal dispersion of MXenes chemically grafted with lipophilic octyltriethoxysilanes (MX@OTS). A high grafting density of OTS on the MXene surface was achieved by employing a strong acid polyelectrolyte as an OTS (water insoluble)-in-water emulsifier. The remarkable hydrophobicity of the octylated MXenes was demonstrated via contact angle measurements and interfacial tensiomery. Despite the negligible surface charging, the hydrophobic MX@OTS showed excellent colloidal stability in very nonpolar hexanes over four weeks.