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Abstract
In this research, an organic/inorganic hybrid UV curable resin was prepared. An acrylic polyol reacting with isocyanate was used as organic backbone which was then end capped with HEMA (Hydroxyethyl Methacrylate) to provide a C = C for subsequent UV curing.

Incorporating CeO2 particle into this organic resin usually leads to CeO2 particles aggregation which dramatically reduce the transparency of the resultant coating. In this study we fist adjust the pH of the organic media to enhance H-bonding between polymer and CeO2 .It improves CeO2 dispersion but only to a small degree. An approach was taken by incorporating DMPA (2,2-dimethylolpropionic acid) to the polymer backbone(ion-ion dipole interaction). An ion-ion dipole interaction was encouraged to occur via adjusting pH of the resin which results in dissociation of COOH in DMPA to COO-. With this approach, the dispersibility is unproved. However, TEM still indicate minor CeO2 aggregation.

An ultimate solution is to establish a covalent bond between organic phase and CeO2. A polyisocyanate with three -NCO group was used to react with the –OH group on the surface of CeO2. The extent of –NCO reaction was monitored through –NCO titration. The between –NCO and –OH was proceed until 1/3 of –NCO is consumed. The remaining 2/3 of –NCO are used to attach to the polymer backbone. The resultant polymer/CeO2 composite show a nano-dispersed CeO2 particle with excellent transmission in visible spectroscopy.
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