

## Synthesis of UV-Cured Hyperbranched Polyurethane Acrylate Coatings and Its Corrosion Resistance Revealed by Electrochemistry

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First generation hyper-branched poly-ester-amine, second generation hyper-branched poly-ester-amine, and isophorone diisocyanate-2-hydroxyethylacrylate are first synthesized and the hyperbranched polyurethane acrylate oligomer is subsequently prepared with the second generation hyper-branched poly-ester-amine. Finally, the UV-cured hyper-branched coatings are produced with the hyper-branched polyurethane acrylate oligomers, methyl acrylate, 2-hydroxyethyl methacrylate, and photo-initiator 1173. The structure of the first generation hyper-branched poly-ester-amine, second generation hyper-branched poly-ester-amine, and hyper-branched polyurethane acrylate oligomers, and UV-cured coatings are characterized by FT-IR, TG, and SEM. The corrosion resistance of the hyper-branched coatings is studied electrochemically and compared to conventional coatings. The self-corrosion rate of conventional coatings drops from 28.022 mm/A to 17.468 mm/A and hyper-branched coatings from 28.022 mm/A to 8.061 mm/A. The hyper-branched coatings have very good thermal properties, corrosion resistance, as well as cross-linking density.

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**Keywords:** UV-curing, hyperbranched coatings, polyurethane acrylate

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