

Novel Scratch Resistant Self-Healing Automotive Clearcoats Using Hyperbranched Polymers and POSS Nanostructures

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Abstract : In this work a typical automotive clearcoat is modified with a combination of hyperbranched polymer (HBP) and polyhedral oligomeric silsesquioxane (POSS) nanostructures to simultaneously enhance the scratch resistance and healing ability of the resulting films. Micro-scratch and healing data revealed that these goals were achieved at high loadings of modifiers. Enhanced scratch resistance was attributed to the improved elastic recovery of the clearcoats in presence of modifiers. In addition, improved healing performance due to the partial replacement of covalent cross-links with physical ones resulted from the unique globular highly branched structure of HBP and POSS macromolecules.

Keywords : automotive clearcoat, POSS building blocks scratch resistance, self-healing

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