

Abstract Submitted
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Self-Repair of Polymer Films Through Monomer Filled Ni-Zn Microcapsules MARCIA PATCHAN, LANCE BAIRD, YO-RHIN RHIM, ERIN LABARRE, ADAM MAISANO, RYAN DEACON, JASON BENKOSKI, JHU Applied Physics Lab — A novel polymer additive composed of isocyanate resin-filled metal microcapsules has been successfully synthesized through a combination of emulsification, interfacial polymerization, and electroless Ni-Zn deposition. The resulting metallic microcapsules impart self-healing and galvanic protection capabilities to off-the-shelf primers. Once scratched, the microcapsules release their contents into the scratch, where they harden and restore the moisture barrier. If healing is incomplete, the Ni-Zn shell acts as a sacrificial anode to galvanically protect the underlying steel. ASTM adhesion, wear resistance, and moisture resistance tests evaluated the ability of microcapsule-filled primers to heal scratches, provide galvanic protection, and prevent corrosion. We found that self-healing was most effective for broad, shallow scratches (3 mm) and narrow scratches (75 μm).

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