CORROSION INHIBITION AND SCALE-UP OF POLY(BIS-(DIALKYL AMINO) PHENYLENEVINYLENE)S

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While poly(bis-(N,N,-dialkylamino) phenylenevinylene)s (BAM-PPV)s have been previously reported,[1] one of these materials (poly(bis-(N-methyl-N-hexylamino)phenylene vinylene) has shown promise as a corrosion inhibition coating on aluminum in simulated seawater.[2] We are currently investigating environmental issues and completing extensive testing of the corrosion inhibition and mechanism.

The United States Navy spends over $2 billion per year on aircraft and ship maintenance due to corrosion.[3] The most widely used corrosion inhibitor is hexavalent chrome. Chromium, other heavy metals, and volatile organic compounds (VOCs) are coming under increasing scrutiny from the EPA.[4]

New environmentally friendly coatings and coating methods are needed to replace existing coating systems. Initial studies based on conductive polymers have demonstrated their corrosion inhibiting properties.[5] Environmentally benign applications of coatings for maritime conditions are under development using conjugated polymers.

In simulated saltwater immersion testing, panels coated with a 3wt.% BAM-PPV/epoxy mixture show no visible corrosion within the scribe lines (**Figure 1**). There is notable ablation in the panel with an epoxy coating (**Figure 2**).

In neutral salt fog studies, panels coated with pure polymer with and without standard mil spec topcoats show corrosion inhibition as good as or better than panels with chromate conversion coatings. In fact, the BAM-PPV also appears to act as an adhesion promoter.

The scale-up of the synthesis of the polymer proceeded well with the production of almost 2 kg of polymer to date. Yields have been increased from the initial work, and waste streams have been reduced.

In this work, we present corrosion inhibition data and synthetic scale-up of poly(bis-(N-methyl-N-hexylamino)phenylenevinylene). Results from immersion, salt fog, and other tests will be presented.

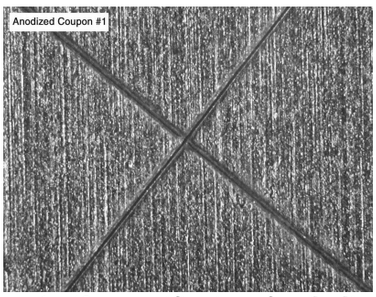

Figure 1. 40x magnification of scribe lines in the 3wt.% BAMPPV/epoxy coating

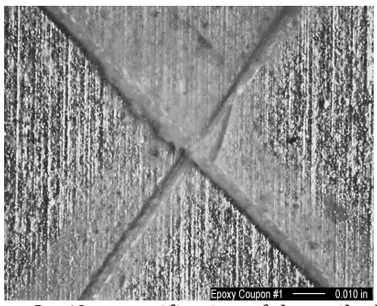

Figure 2. 40x magnification of the scribe lines in pure epoxy coating

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