

Environmentally Friendly Coating Development at NASA Kennedy Space Center

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The NASA Corrosion Technology Laboratory at the Kennedy Space Center is developing environmentally friendly coatings for use in corrosion sensing and protection and for environmental contaminant removal. Smart, or functional, and barrier coatings are being developed. Smart coatings are characterized by their ability to sense their environment and create an appropriate response. Chromate containing coatings are a good example of this type of coating and their overwhelming success can be attributed to their performance as a 'damage responsive' material. Unfortunately, these coatings are hazardous to the environment and need to be replaced.

The smart coating being developed for corrosion sensing and protection is based on microencapsulation technology. This coating detects corrosion by responding to the pH changes that take place when localized corrosion occurs. The microcapsules can be loaded with corrosion inhibitors that are released to stop corrosion at an early stage. The inhibitor is only released in the area where corrosion is beginning, mimicking chromate coatings. An environmentally friendly powder coating is being developed from novel powder resins designed at KSC. Preliminary coating formulations show promising physical properties and good corrosion resistance. The 'self-cleaning' coatings being developed at KSC are designed for environmental contaminant (chemical and biological) removal without human intervention. The goal is to create a coating that chemically destroys contaminants, leaving little or no residue.

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