

Conversion Coatings in Extreme Environments - Analysis of Chemical and Morphological Changes

Kate Foster¹, Ankita Mohanty², Xiaoyang Liu², Cheng-Chu Chung², Donald Vonk¹, Kim Kisslinger³, Xiao Tong³, Stanislas Petrash¹ and Yu-chen Karen Chen-Wiegert²

Conversion coatings - often known as metal pretreatments - are applied to metallic substrates to enhance corrosion resistance and promote adhesion of subsequent layers. A deeper understanding of how these coatings respond to extreme environments enables the development of improved protective systems for industries that rely on coated metal components.

In this study, we exposed conversion coated metal samples to low Earth orbit (LEO) for six months, while maintaining an identical set of samples under terrestrial conditions. Following exposure, both LEO and terrestrial samples were analyzed to assess chemical and morphological changes resulting from these different extreme environments. Analyses consisted of using a suite of electron microscopy and X-ray spectroscopy techniques. This presentation will detail the methodology for the analytical approach used to characterize material degradation. A quantitative comparative evaluation of the LEO exposed and terrestrial sample sets will be made to delineate the effects of specific types of environmental stressors on conversion coatings.

- 1) Henkel Corporation
- 2) Department of Materials Science and Chemical Engineering, Stony Brook University
- 3) Center for Functional Nanomaterials, Brookhaven National Laboratory