

Abstract Submitted
for the OSS15 Meeting of
The American Physical Society

X-Ray Photoemission Spectroscopy Study of 4140 Steel Surfaces Treated With 3-Aminopropyltriethoxysilane COURTNEY RICHARDS, STEPHEN CORNICH, HOLLY MARTIN, SNJEZANA BALAZ, Youngstown State University — In this study, we used X-ray Photoemission Spectroscopy (XPS) to investigate elemental, chemical state, and electronic properties of 4140 steel surfaces. To better understand the effects of various activation methods on the types of oxides present, the steel surfaces underwent three different treatments, specifically piranha [1], H₂SO₄, and HCl. The ability of the oxides to bond with 3-Aminopropyltriethoxysilane (APTES) was also investigated. The treated 4140 steel surfaces were compared with and without APTES, examining changes in the types of oxygen, carbon, nitrogen, and silicon present. The purpose of this study was to investigate the surface reactions and to gain a better understanding of the surface chemistry of treated 4140 steel. The findings of the relationships between the different activation methods and their ability to bond APTES to the surface will lead to the development of a reaction scheme to bond chitosan, a bactericidal polymer, to steel for the prevention of microbially-influenced corrosion on oil pipelines.

[1] Martin, H.J.; Schulz, K.H.; Bumgardner, J.D.; Walters, K.B. *Langmuir* 2007, 23, 6645-6651.

Courtney Richards
Youngstown State University

Date submitted: 09 Mar 2015

Electronic form version 1.4