

22nd International Conference on

Graphene, Carbon Nanotubes and Nanostructures

September 17-18, 2018 | Berlin, Germany

Development of advanced nano-coatings for application in corrosive environments

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This research is focused on the development of advanced nano-composite coatings for application in corrosive and non-conventional medium. Nano particles with varying electrochemical, tribological and mechanical properties have been incorporated to design nano-coatings with enhanced tribological performance such as wear rate, mechanical properties such as micro hardness and electrochemical properties such as resistance to corrosion. Pulse coating technique has been deployed to develop thin coatings of up to 10 μm thick. Cross sectional investigations have been performed for adhesion and interfacial characteristics and results are presented. Tribological tests were conducted to evaluate the wear performance in corrosive lubricants. Specific wear rate results of various nano-coatings are presented. Standalone potentiostatic and dynamic tests were performed to evaluate the electrochemical changes for monitoring their corrosion performance. Corrosion response of these newly developed nano-coatings was compared with steel and Ni-P samples. Results of their performance are presented in this paper. These performances were then investigated in comparison to wear cycles, wettability contact angle and coating thicknesses for bespoke design of nano-coatings for intended applications.

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