



Graphene coating: A long-life time performance to battery steel

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Abstract:

Recent developments in graphene production offer a wide variety of graphene properties application in the product portfolio of Tata Steel Europe. One of the most demanding nowadays is Ni plated steel for battery applications. However, oxidation of Ni layer is detrimental to its long stability in shelf life performance. Hence Tata Steel Europe developed graphene coatings directly on steel substrates using photo-thermal chemical vapour deposition which provides a long-term protection to Ni plated steel against oxidation under ambient conditions. X-ray photoelectron spectroscopy and High Resolution-Scanning Electron Microscopy analysis study demonstrated that graphene coated Ni surface sustains the initial metallic grain structure reveals an excellent protection of the Ni surfaces after exposure to normal air for more than 2 years while bare Ni surface gets oxidised and provides a rough and highly porous Ni oxide surface structure within 2 hours. Our findings suggest that this extremely thin material (up to 10 monolayers) can protect various metallic substrates and highlight the key properties for applications of these materials as an excellent corrosion-controlling coating and moreover offering an enhanced conductivity and heat dissipation. Another examples of graphene coatings will be discussed towards the development of novel anticorrosive coatings.

Biography:

Erdni Batyrev graduated in solid state physics from Saint-Petersburg State University. He obtained a PhD from University of Amsterdam in heterogeneous catalysis. As a post-doc at the Condensed Matter Physics group, Free University Amsterdam, he studied hydrogen storage



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Since 2008 he is materials scientist at Tata Steel Europe, Research and Development.

His research interests focus on physical properties of new materials and its surfaces, functional coatings and hydrogen interaction with solids.

Publication of speakers:

- Erdni Batyrev, August (2019) Advanced Engineering Materials 21(10) Graphene technology for steel
- Erdni Batyrev ,(October 2017) Angewandte Chemie International Edition 57(6)
- Erdni Batyrev, October (2016) Surface and Coatings Technology 309
- Erdni Batyrev, July (2010) The Journal of Physical Chemistry C 114(32):13895 Project: Hydrogen storage
- Erdni Batyrev, May (2007) Crystallography Reports 52(3):474-478

International Webinar on Smart Materials; November 17, 2020; Amsterdam, Netherlands

Citation: Erdni Batyrev, Graphene coating: A long-life time performance to battery steel; Smart Materials 2020; November 17, 2020; Amsterdam, Netherlands