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Authors: M. Czagány, P. Baumli, G. Kaptay



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The influence of the phosphorous content and heat treatment on the nano-micro-structure, thickness and micro-hardness of electroless Ni-P coatings on steel

M.Czagány^a, P.Baumli^a, G.Kaptay^{a,b,c,x},

^a University of Miskolc, Department of Nanotechnology, 3515 Hungary, Miskolc, Egyetemvaros

^b MTA-ME Research Group on Materials Science, 3515 Hungary, Miskolc, Egyetemvaros

^c Bay Zoltan Ltd on Applied Research, Department of Materials Development, 3519 Hungary, Miskolc, Igloi 2

^x corresponding author, e-mail: kaptay@hotmail.com, phone: +36 30 415 0002.

Highlights to the paper:

- Electroless Ni-P coatings are received and characterized from six different baths
- The grain size is modelled through the P-content of the coating
- The coating thickness is modelled through the modelled grain size
- The micro-hardness of the as-received coating is modelled through the modelled grain size
- The inverse Hall-Petch relationship is obtained for the grain size dependence of micro-hardness
- The micro-hardness of the annealed coating is modelled through the volume fraction of the precipitated hard Ni₃P phase
- The micro-hardness of the as received coatings decreases, while that of annealed coating increases with increasing P-content and decreasing grain size

Abstract

Electroless Ni-P coatings were obtained on steel substrates using different bath compositions, which lead to different phosphorous contents of the coatings. In this paper the effect of the P-content in the Ni-P coatings was experimentally studied on the thickness of the coating, on its nano-micro-structure and on its micro-hardness. The as-received samples were nano-crystalline (mostly amorphous according to XRD) and their micro-hardness was found to

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