

**The 16th Scientific Student Conference On Metallurgical and Materials Engineering
November 2019 – Iran University of Science & Technology**

Investigation of the formation of sputtered Copper-Silver composite coatings on AISI 430 stainless steel

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Abstract

In the present research, the duplex coating of silver-copper oxide was deposited on AISI 430 stainless steel substrate using sputtering method under argon atmosphere. X-ray diffractometry on the coated substrate revealed that duplex layer of Ag-Cu_xO was formed on the surface of steel. X-ray patterns determined that the deposited layer was not silver-copper layer due to remaining oxygen in sputtering compartment. The thermodynamics calculations showed that copper oxide is more stable than silver oxide, therefore the silver-copper oxide duplex was formed. The changing of coating order was not effective on the nature of coating. The quantitative analysis on the deposition using Rietveld refinement determined the content of phases and crystalline size. Scanning electron microscopy (SEM) and mapping analysis showed microstructure and the distribution of element respectively.

Keywords: Sputtering method, AISI 430 stainless steel, Copper-Silver composite coatings, Rietveld refinement

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