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Internal stress and friction measurements during MoS₂-nickel electrodeposition

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The electroplating method is a promising alternative to produce composite plating by using dispersed fine particles in the metal plating bath. The process can be either called electro co-deposition or composite deposition. The particles are trapped in the deposit during the process. Internal stress is a common problem in plated deposits that affect the performance of the coatings and may even result in adhesion problems. Hence, the amount and type (compressive or tensile) of the internal stress must be controlled. MoS₂ particle-nickel coatings can be referred as self-lubricating coatings that satisfy the demand for decreased friction in severe applications. The internal stress during MoS₂ particle-nickel electrodeposition was measured by deposit stress analyzer. The effects of electroplating parameters that are MoS₂ particle concentration (0 and 10 g/l), temperature and coating thickness (25 and 50 µm) on the internal stress values were investigated by Taguchi design. It is found that increasing MoS₂ particle concentration and coating thickness led to decrease in the internal stress developed during MoS₂-nickel composite coatings. Interaction effects of these parameters were also revealed. The most effective parameter on internal stress was determined as MoS₂ concentration by regression analysis. Therefore, three different MoS₂ concentrations (0, 10 and 30 g/l) were studied in order to find out the concentration effect on the coefficient of friction and wear rate by pin-on-disc tribometer.

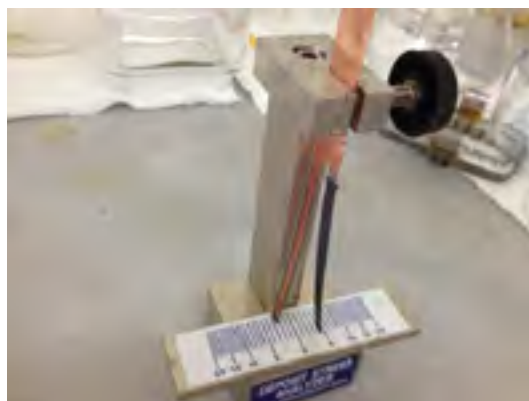


Figure 1: Photograph of bent strip and deposit stress analyzer showing 7 units increment after MoS₂-nickel electroplating.

Biography

Ebru Saraloglu Güler is an Assistant Professor in the Department of Mechanical Engineering at the Baskent University in Ankara, Turkey. She received her BSc and MSc degrees from the Middle East Technical University, Turkey in 2006 and 2008, respectively. She got her PhD degree from Metallurgical and Materials Engineering department of Middle East Technical University in 2013. Her main interests are phase electroplating and composite materials.

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