

4th European Chemistry Congress

May 11-13, 2017 Barcelona, Spain

Electrodeposition of nickel on glassy carbon electrode: The rotating disk study

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Electrodeposition of nickel was studied by using rotating disk technique. The electrode substrate was glassy carbon disk cut from a glassy carbon wafer produced by Toshiba. The disk was mounted on a rotation speed controlled rotator made by IBM Instruments. The electrochemical deposition was studied from nickel ammonium sulfate solutions of different concentrations and pH, as the reaction parameters. The electrochemical techniques used were cyclic voltammetry, linear sweep voltammetry, and chronoamperometry. The key feature of this study is that amount of electrodeposited disk was determined by two methods i.e. charge passed and amount of nickel deposited at particular time intervals, such as 15, 30 and 60 seconds. Charge was determined by using a coulometer wired in line with the working electrode. Nickel deposited was determined by dissolution in nitric acid and analysis by atomic absorption. Both types of data were used in Levich equation for determination of kinetic parameters, such as reaction order, activation energy, etc. For example, it was found that electrodeposition of nickel is of first order, and that the activation energy was only 2.7 kcal/mol indicating, a mass transfer controlled reaction. The current efficiency was a function of concentration, increasing with the increase of nickel concentration. Morphology of electrodeposit was very smooth as confirmed by atomic force microscopy.

Biography

Batric Pesic is a distinguished Professor at the University of Idaho. He has received BS degree in Metallurgical Engineering from the University of Belgrade; MS (1976) and PhD (1982) from the University of Utah, USA. Upon graduation, he moved to Canada and worked for HBMS, Flin Flon, Manitoba. In 1983, he joined the University of Idaho, USA. His research interests have been, initially in extractive metallurgy, followed by environmental subjects. Currently, he is doing his research on electrochemistry of molten salts. He has extensive consulting experience with major chemical and metallurgical corporations in North America, Europe and Africa.

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