Growth modelling of chemically-deposited nickel thin films on float glass by ellipsometry

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Glass slides sensitized and activated with chemicals can be coated with metallic nickel using an autocatalytic redox reaction. This reaction takes place within a liquid medium. The nickel layer growth begins with a nucleation stage; the nuclei then coalesce to form a continuous rough layer.

The layer growth can be monitored in situ with a spectroscopic ellipsometer. The evolution of the complex optical index of the layer and its thickness versus time can be extracted from the ellipsometric measurements.

During its growth, the layer exhibits a dielectric behavior which can be modelled with an anisotropic Maxwell-Garnett effective medium theory. This model allows to calculate the evolution of the nickel volume fraction in the layer versus its thickness. These results are used in a geometrical growth model to compute the average distance between the nickel nuclei on the glass in the early stages of growth and to compute the final roughness of the layer.

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