Synthesis of Anisotropic Mesostructured Gold Electrodeposits

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Anisotropic mesostructured gold electrodeposits were synthesized on an indium tin oxide (ITO) glass from a solution of sodium disulfiteaurate (I) by a rectangular pulse current technique. Characterization of the gold electrodeposit was performed using a scanning electron microscope (SEM), X-ray diffraction (XRD), and energy dispersive X-ray spectrometry (EDX). Two shapes of the gold electrodeposits, which change with the solution temperature and the amplitude of the rectangular pulse current, are obtained; one is a star-like concave polygon with a lot of horn and the other is a truncated pyramid-like configuration. A gold thin film comprising of the star-like gold electrodeposit includes a large number of mesostructured pores. The pyramid-like electrodeposit has four triangular (111) planes. The gold electrodeposits are shown to be purely made of gold by the EDX measurement. The XRD measurement reveals a texture change in the gold thin film from the (111) plane to the (110) one with the growth time, whereas the surface morphology obeys the surface energy minimum.

Keywords: star-like gold electrodeposit, pyramid-like gold electrodeposit, texture coefficient, sodium disulfiteaurate (I), surface energy minimum

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