Epitaxial Growth of Metals on Rocksalt Faces Cleaved in Vacuum: II. Orientation and Structure of Gold Particles Formed in Ultrahigh Vacuum

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Epitaxial Growth of Metals on Rocksalt Faces Cleaved in Vacuum

II. Orientation and Structure of Gold Particles Formed in Ultrahigh Vacuum*

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Abstract

The orientation and structure of gold particles formed by evaporation on rocksalt cleaved in ultrahigh vacuum have been studied at various stages of the nucleation and growth process. Besides four 200 and twenty-four 220 spots which indicate the presence of the (001) orientation and (111) orientation respectively, twenty-four abnormal 111 spots have been observed in electron diffraction patterns taken at earlier stages of growth, and various unusual contrasts have been observed in dark field electron micrographs using one of 111 spots. A multiply twinned particle model is proposed by the present author, and the appearance of the 111 spots and the dark field image contrasts can satisfactorily be explained by this model. With increasing thickness particles with the (111) orientation and without the multiple twinning exclusively grow up, while multiply twinned particles and those with the (001) orientation seem to stop their growth; and a continuous gold film with the (111) fibrous structure is formed at a thickness of about 500Å.