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Host: Jerry Floro

Title: "Continuous orientation gradients and discontinuous boundary structure in Ta thin films"

Date: Monday, October 13

Time: 4:00 to 5:00 PM

Refreshments: 3:30 to 4:00

Room: Wilsdorf 101

ABSTRACT:

Tantalum thin films are important in a wide range of nano- and micro-fabricated technologies. For example, Ta films serve as the interface between the ink and the heater in many thermal inkjet print heads. The equilibrium (alpha) phase of bulk Ta at room temperature and pressure is bcc, but it is possible to deposit Ta in the metastable tetragonal phase under certain conditions. We have recently discovered a unique microstructure in thin alpha-Ta films created by phase transformation from the beta phase. This microstructure is characterized by continuous changes in orientation with position and a discontinuous boundary structure. Orientation maps from these structures show quite unexpected and beautiful structures. In the present work, we show that the nature and distribution of orientation gradients is strongly dependent on film thickness and oxygen content. A detailed analysis of the orientation distributions suggests that the structure can be attributed to dislocation arrays that arise due to kinetic limitations during the phase transformation.