東京大学グローバルCOEプログラム　機械システム･イノベーション国際拠点

東京大学 THE UNIVERSITY OF TOKYO

GMSI Global Center of Excellence for Mechanical Systems Innovation

2009. 6. 4 GMSI Seminar Series

# Interface characteristics in variant heteroepitaxial systems


## Dr. X.L.Ma

**Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, Shenyang 110016, P. R. China**


**日時：2009年 6月 4日（木）　15:00 – 16:30**
**会場：東京大学工学部総合研究機構9号館1階　大会議室**

## 要旨


Various techniques associated with transmission electron microscopy have been applied to study the heterophase interface structure at an atomic scale. Interface structures have been classified into three types. (1) Formation of periodic mismatch dislocations, and formation of dimensionally uniform and nanoclusters. Such nanoclusters are quite similar to the quantum dots in conventional semiconductors as far as the dimensions, geometric shape and composition are concerned.
(2) Thickness-dependent structural transformation. We clarified the nature of the thickness-dependent structural transformation in AlN film. The non-equilibrium cubic AlN, which normally exists under high pressures of more than 22.9 GPa, can be epitaxially stabilized in ambient atmosphere in the form of thin films grown on TiN substrate. A critical thickness, about 1.95 nm, at which the pseudomorphic growth cannot be preserved and after which the cubic phase transforms into its hexagonal counterpart, has been quantified. By means of the crystal-chemical atomic dynamics based on the first-principles calculations, we provide in-situ physical details in an atomic scale on the thickness-dependent structural transformation, which are hardly observed in experiments.(3) Formation of oriented domains in CMR films. Electron micro-diffractions and high-resolution imaging reveal that the La0.8Sr0.2MnO3 thin film with thickness of 200 nm is epitaxially grown on the SrTiO3 (001) substrate. The microstructures in the whole film are clarified in terms of the oriented micro-domains. Crystallographic relationships of these domains are discussed on the basis of an orthorhombic unit cell. Theoretical calculations based on a geometrical model that was recently proposed and applied to a number of epitaxial systems have been carried out to rationalize the present observations.



主催：　東京大学グローバルCOEプログラム「機械システム・イノベーション国際拠点」事務室
本件連絡先：　東京大学大学院工学系研究科総合研究機構ナノ工学研究センター　教授　幾原雄一
E-mail: ikuhara@sigma.t.u-tokyo.ac.jp,　Phone: 03-5841-7688
GCOE事務局　E-mail: gmsi-office@mechasys.jp,　Phone: 03-5841-7437