

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Epitaxial Growth of Zinc Oxide on Single Crystalline Gold Plates

KATHRYN GREENBERG, JOHN JOO, MOR BARAM, DAVID CLARKE, EVELYN HU, Harvard University School of Engineering and Applied Sciences — Although metal-oxide interfaces are the critical components of many electronic and optical devices, it is rare to find epitaxial metal-oxide structures. We demonstrate for the first time, a method for the low temperature, epitaxial growth of zinc oxide (ZnO) on single crystalline gold plates. The gold plates, up to $100\mu\text{m}$ in width, are grown from a gold-surfactant complex. Even with the large lattice mismatch between (111) gold and (0001) ZnO, we are able to form epitaxial zinc oxide at 90°C on top of the single crystal gold plates. This epitaxial growth is confirmed using transmission electron microscopy, electron diffraction, and electron backscatterer diffraction. Micro-photoluminescence is also performed to investigate the optical properties of the epitaxial zinc oxide. We remove the grown ZnO membranes from the gold plates using a stamping and etching process. These membranes can potentially be used to fabricate high quality microdisks and photonic crystals. The metal-oxide interfaces that we have fabricated may have the ability to be used in a number of technologically important applications, including as better electrical contacts and for improved light extraction from planar LED structures.

Kathryn Greenberg
Harvard University School of Engineering and Applied Sciences

Date submitted: 06 Nov 2011

Electronic form version 1.4