MRS FALL MEETING: LOG NO: D091

BALLISTIC ELECTRON EMISSION MICROSCOPY OF METAL/GROUP IV INTERFACES*

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Ballistic electron emission microscopy and spectroscopy, together with related techniques, have been applied with great success to the study of buried interfaces. These probes, known collectively as BEEM, have yielded important information on interface transport, interface band structure, and carrier scattering, with lateral spatial resolution on the nanometer scale. Recent applications of the technique to polycrystalline metal/semiconductor interfaces have demonstrated an ability to spatially map both conduction band and valence band semiconductor structure.

BEEM studies of epitaxial silicide/silicon interfaces have been particularly fruitful, as the rich silicide band structure results in complex and often surprising transport behavior. In $CoSi_2/Si$, for example, photoresponse and other electrical measurements indicate an n-type Schottky barrier height of 0.65-0.7 eV while analysis of the band structure suggests that momentum conservation should push the threshold for electron transport substantially higher. This "theoretical" threshold can be observed with BEEM and, moreover, measurements using the "reverse" BEEM technique, reveal the mechanism that results in the lower photoresponse barrier. New results on the metal/SiGe system demonstrating strain-induced splitting will also be presented.

* Research supported by ONR and SDIO/IST.

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