

Umklapp-Mediated Quantized States in Ag-Si Quantum Wells

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Angle-resolved photoemission studies of ultra-thin atomically uniform Ag films prepared on Si(111)-(7x7) substrates show Umklapp-Mediated Quantization of Electronic States near the \bar{M} points in the Si surface Brillouin zone despite the (7x7) reconstruction including a stacking fault. No such states are observed at the \bar{K} points located at the silicon surface zone edge. Similar states have been observed in the Si/Ge(111) system. However the Umklapp-Mediated States in the Ag/Si(111) system appear to be weaker due to the complicated Si reconstruction.

Figures A, B, and C show photoemission data for Ag films of 12, 16 and 20 monolayers, respectively, taken along the $\bar{\Gamma} - \bar{M}$ direction. The nearly parabolic subbands normally

associated with quantum wells can be seen dispersing about the $\bar{\Gamma}$ ($\theta = 0$), and the Umklapp-Mediated States, indicated by a yellow box in the right-hand side of each figure, can be seen dispersing about the silicon \bar{M} point ($\theta \approx 17^\circ$).

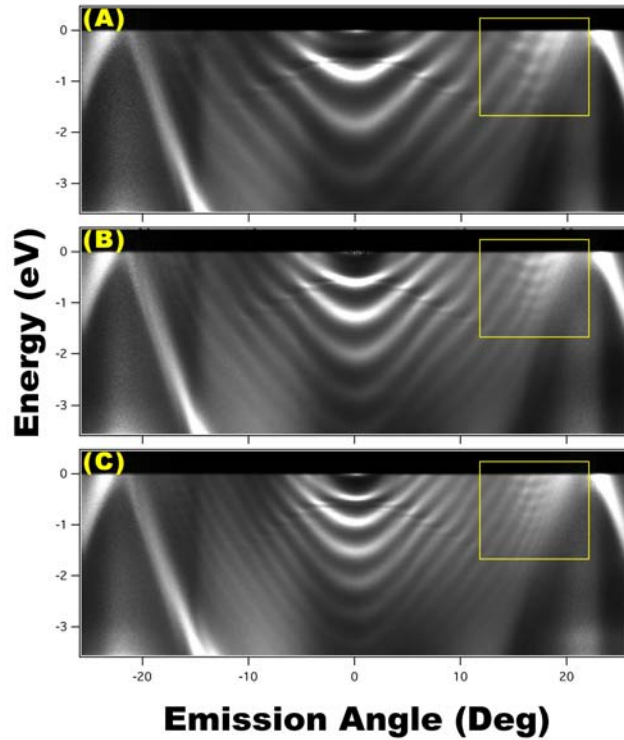


Figure (A), (B) and (C): Angle-resolved photoemission data for 12, 16 and 20 monolayers of Ag grown on Si. Umklapp-Mediated states are indicated by yellow box in each figure.

References:

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