

[S-09]

THE ORIGIN OF THE METALLIC STATES ON The Ge(100) SURFACE

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Semiconductor surfaces exhibit a temperature-induced metallization upon raising temperature. Photoemission spectroscopy (PES) and low-energy electron diffraction (LEED) studies on Ge (100) surface, Kevan and Stoffel, observed a metallic state above 130K whose intensity increases as temperature rises ⁽¹⁾. At the same time, a c(4x2) LEED pattern was observed to convert to a 2x1. A similar increase in metallicity with temperature (up to about 900K) on the Si(100) was reported in a recent study ⁽²⁾.

In this work, angle resolved ultra-violet PES was utilized to investigate the metallization on the Ge(100) surface from room temperature up to 900K. The metallic state was observed at about 580 K around two symmetric points without any change in LEED pattern.

Based on these results, we'll discuss the difference and similarity between the origin of the metallic surface states of the Ge and Si(100) surface.

[Reference]

1. S. D. Kevan, N. G. Stoffel, Phys. Rev. Lett. 53, 702, 1984
2. C. C. Hwang et al., Phys. Rev. B 64, R201304, 2001.

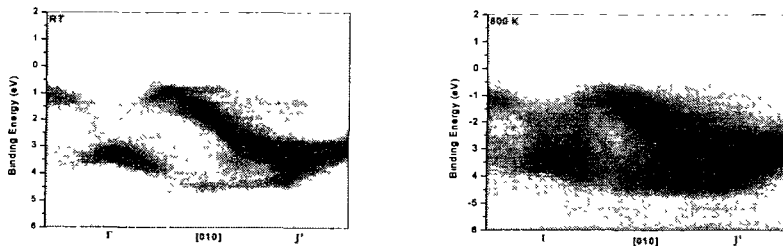


Fig. 1 Experimental band structure for the 2x1 surface at room temperature (a) and 800K (b).