

Publication

Atomic contact potential variations of Si(111)-7 * 7 analyzed by Kelvin probe force microscopy

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We studied atomic contact potential variations of Si(111)-7 x 7 by Kelvin probe force microscopy with the amplitude modulation technique at the second resonance of a silicon cantilever. Enhanced sensitivity due to the high mechanical quality factor in ultra-high vacuum enabled local contact potential difference (LCPD) measurements of individual adatoms. The contrast of the measured LCPD map became stronger by reducing the tip-sample distance, and the averaged LCPD value shifted to more negative. The short-range interaction, arising from the covalent bonding interactions, strongly affects the LCPD measurement. Theoretical calculations indicate that the amplitude modulation method has a higher sensitivity than the frequency modulation method in practical cases. The tip-sample distance dependence of LCPD was investigated by numerical calculations.

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