

Anisotropic Interface Roughness Scattering in a Lateral Superlattice

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Abstract: A novel interface roughness due to the perturbation of the periodic interface structure is studied theoretically for a lateral superlattice realized by an interface corrugated quantum well. It is found by numerical simulation that the correlation function for interface roughness can be well modeled by a sinusoidal function with an exponential decay in the direction of corrugation. Such a feature makes the correlation function far from a Gaussian function which is extensively used as a theoretical approximation of the correlation function for interface roughness. With such a correlation function, the influence of interface roughness scattering on electronic transport in the lateral superlattice is investigated. Consequently, it gives rise to a high anisotropy of electronic transport both in the absence and presence of a magnetic field, by which the relevant experiments can be well explained.

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Key words: interface roughness, lateral superlattice, correlation function, anisotropic conductivity

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