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Carrier Transport and Band Offsets in Two Dimensional Heterostructures

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**Abstract:** Advances in the low dimensional heterojunction device technology cannot be complete without adequate and reliable analytic model for determining interface properties such as band offsets needed to study the carrier transport and to evaluate the device performance at high temperatures and pressures. In this article, using the extended universal tight binding model of semiconductors, a new way of determining the band offsets in heterostructures is presented. In this model the band offsets are first determined by aligning the vacuum level, defined relative to valence band maximum which is screened by optical dielectric constant of semiconductors, at the interface at absolute zero temperature and standard pressure and then using the thermochemical principles for electrons and holes in intrinsic semiconductors the temperature and pressure effects are included. Excellent agreement is obtained between model predictions and experiment.

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