A Phenomenological Study of Adsorption on fcc (335) Terraces[1]

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— The thermodynamic equilibrium model of adsorption on fcc (112) terraces (Langmuir 22, 7646, 2006) is extended to adsorption on fcc (335). There is preferential adsorption on one of the steps, and the difference, U, between adsorbate-substrate interaction energy on this step, V_s, and that on the rest of the terrace, V_b, is not necessarily zero. First-neighbor adsorbate-adsorbate interaction energy V is usually repulsive, and we consider $V < 0$, account for arbitrary second-neighbor interaction energy W, and allow the chemical potential energy per particle in the gas μ' to vary. The relatively low temperature 3-D energy phase diagram is obtained in terms of $u = -U/V$, $v = -\mu/V$, and $w = -W/V$, where $\mu = \mu' + V_b$. Based on this diagram, the experimental observation of just one or more phases allows one to predict the ranges or, ultimately, all of the values of u, v, and w. As the model is phenomenological and does not require the knowledge of the chemical composition of the substrate and the adsorbates, it can be applied to adsorption on a wide variety of fcc (335) terraces.

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