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Determination possibility of equilibrium crystal form basing on analysis of its skeleton and dendritic forms

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Taking specific cases as examples, the determination possibility of equilibrium crystal form basing on analysis of its skeleton and dendritic forms is considered. General formation regularities of equilibrium, skeleton, and dendritic forms have shown to be inherent in crystals independent of the chemical binding type therein. These regularities are defined by the growth rate anisotropy. In various crystals, the growth rate diagram with respect to the structure element shows maximum values in directions of the lattice voids. Thus, the growth rate anisotropy corresponds to the lattice voids arrangement in the environment of its structure element (an atom, ion, or molecule). It can be supposed therefrom that the anisotropy is inherent in the lattice structure element. The conformity can be used as an auxiliary criterion when determining the equilibrium forms.

На конкретных примерах рассмотрена возможность определения равновесной формы кристалла из анализа его скелетных и дендритных форм. Показано, что независимо от типа химической связи кристаллам присущи общие закономерности построения равновесной, скелетной и дендритной форм, которые определяются анизотропией скорости роста. В различных кристаллах диаграмма скорости роста относительно структурного элемента имеет максимальные значения в направлениях пустот решетки. Таким образом, анизотропия скорости роста соответствует расположению пустот решетки в окружении ее структурного элемента (атома, иона или молекулы). Из этого можно предположить, что анизотропия присуща структурному элементу решетки. Обнаруживаемое соответствие может быть использовано как вспомогательный критерий при определении равновесных форм.

The crystal form is known to be defined by the lattice symmetry, binding forces between the structure units (ions, atoms, molecules, or molecular complexes), and external conditions of its generation [1]. It is just the form having the minimum surface energy at constant temperature, pressure, and volume that is believed to be the equilibrium one.

The connection between the growth forms and equilibrium ones consists in that the equilibrium form faces may arise on the growth forms [1]. Therefore, the roughness character of the crystallization front can be preset by the crystal orientation under account for these faces [2].

Theoretically, the equilibrium forms for a series of simple crystal lattices with homeopolar and heteropolar bounds were defined by Stransky and Kaishev [1]. According to [3], the stationary crystal face system is defined by periodic chains of strong bonds.

In experiment, the equilibrium crystal forms are obtained by crystallization or by dissolution of spherical crystals [4]. The