

Morphology and Crystallography of Cr Small Particles

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Chromium smoke particles prepared by the gas evaporation method (evaporation of materials under the atmosphere of inert gases) have the A15 structure besides the stable bcc structure. The crystal-morphological shapes of A15-Cr particles were studied by electron microscopy and subsequent geometric modeling made on the basis of thermodynamical considerations. The predominant shape was the {211} icositetrahedron, as reported earlier. In addition, icositetrahedra truncated by {110} planes were frequently observed. By consideration of the surface energy at 0 K, the stable Wulff polyhedron was found to be the {211} icositetrahedron as the fundamental form, and it was found to be slightly truncated by {100}, {110} and {210} planes. The discrepancy in the degree of truncation between the experimentally observed and the theoretical particle shapes may be explained by the influence of the surface entropy. The icositetrahedral particles are characteristic of the A15-structure itself but not of the specific composition of the material.