

Microsymposium

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Nanoparticles: from wulff to winterbottom, plasmonics & catalysis

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Understanding the structure of nanoparticles is a problem with over a century of history from the first analysis by Wulff which was only proved during WWII by von Laue with the extension for supported particles on a flat substrate by Winterbottom. All these analyses have focused on single crystals, but often nanoparticles have different structures as first shown by Ino and Ogawa who published just ahead of Allpress and Sanders. These structures, called multiply-twinned particles or MTPs remained incompletely understood until a variant of a Wulff construction was shown to explain their equilibrium shapes. Given the growth of nanotechnology in the last decades, significant advances in synthesis and characterization methods have been made so it is time to return to some of these topics and look further. It appears there is still a fair amount of science left to be done, ranging from Wulff shapes for alloys to understanding the growth shapes of nanoparticles based upon a kinetic variant of the modified Wulff construction. Some recent results such as finite size effects for alloys and single-phase nanoparticles as well as corner rounding and how these couple to the chemical potential and substrate interfacial energy, as well as how these relate to applied topics such as nanoplasmonics and face-selective catalysis will be described.

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