

Cluster deposition: from atomic structure to applications

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The controlled deposition of size-selected clusters creates new possibilities for the fabrication of both biochips and model catalysts [1]. Knowledge and control of the 3D atomic structure of the cluster is relevant to these applications, as it is to the fundamental physics and chemistry of the clusters. Direct structural measurements of clusters in the gas phase are very challenging. Here we demonstrate that measurement of the scattered intensity - the high angle annular dark field (HAADF) signal - in the scanning transmission electron microscope (STEM) allows us (a) to count the number of atoms in a cluster on the surface and (b) to determine a 3D atom-density map of the cluster when an aberration-corrected STEM is used [2]. Moreover, size-selected clusters can also be used as a mass standard to "weigh" metal nanoparticles produced by other, less precise but sometimes more practical methods: this is mass spectrometry on the surface.

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2. Z.Y. Li, N.P. Young, M. Di Vece, R.E. Palmer, A.L. Bleloch, B.C. Curley, R.L. Johnston, J. Jiang, J. Yuan, *Nature* **451** 46 (2008).

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