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A General Route to Inorganic Nanoparticles Using a Condensed Electron Beam MARISSA CALDWELL, Stanford University, SHAUL ALONI, JEFFREY URBAN, DELIA MILLIRON, LBNL, H.-S. PHILIP WONG, Stanford University — Inorganic nanoparticles are of interest to study the size dependence of various material properties. However, current colloidal synthetic routes are limited in the scope of accessible inorganic materials. Here we present a facile route to inorganic nanoparticles of a wide range of material compositions and sizes. Using the beam from an electron microscope, 2 – 100nm particles were formed from micron sized pieces of a wide range of materials including: semiconductors, metals, insulators. Using this route, we have produced nanoparticles of over 25 different compositions. Each material demonstrated an energetic threshold barrier to particle formation. To help elucidate the formation mechanism, we collected cathodoluminescence spectra which, when correlated with known temperature-dependent bandgap data, showed a large increase in temperature due to the e-beam-to-material interaction. The temperature rise dependence on the e-beam current and acceleration voltage was studied. We conclude that the temperature rise is large enough to compare with vaporization energies and is a plausible mechanism for the production of nanocrystals.

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