Direct Fabrication of Zero- and One-Dimensional Metal Nanocrystals by Thermally Assisted Electromigration

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Supporting Figures

Figure S1. Zn single nanocrystal.

Figure S2. Transformation of Zn from liquid into solid.

Supporting Movies

Movies S1 to S3

Supporting Figures

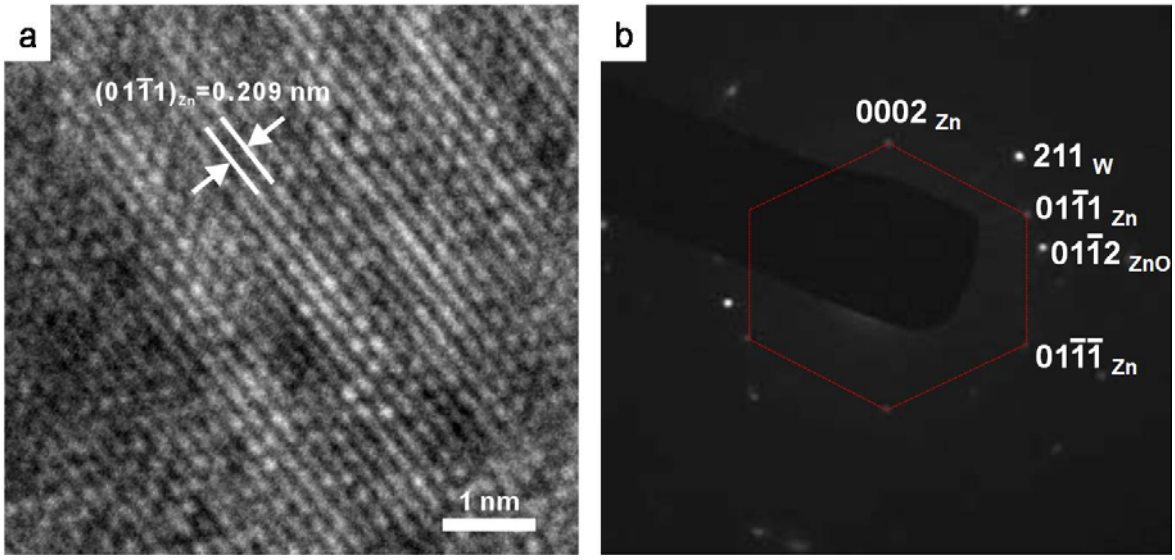

Figure S1. Zn single nanocrystal. (a) High-resolution TEM image acquired from a created nanodot shows the $(01\bar{1}1)$ lattice fringes of a hexagonal Zn. (b) Selected area electron diffraction pattern acquired from a created nanodot indicates the spots along $[\bar{2}110]$ zone-axis of single crystal Zn with other spots from ZnO, W, and Si.

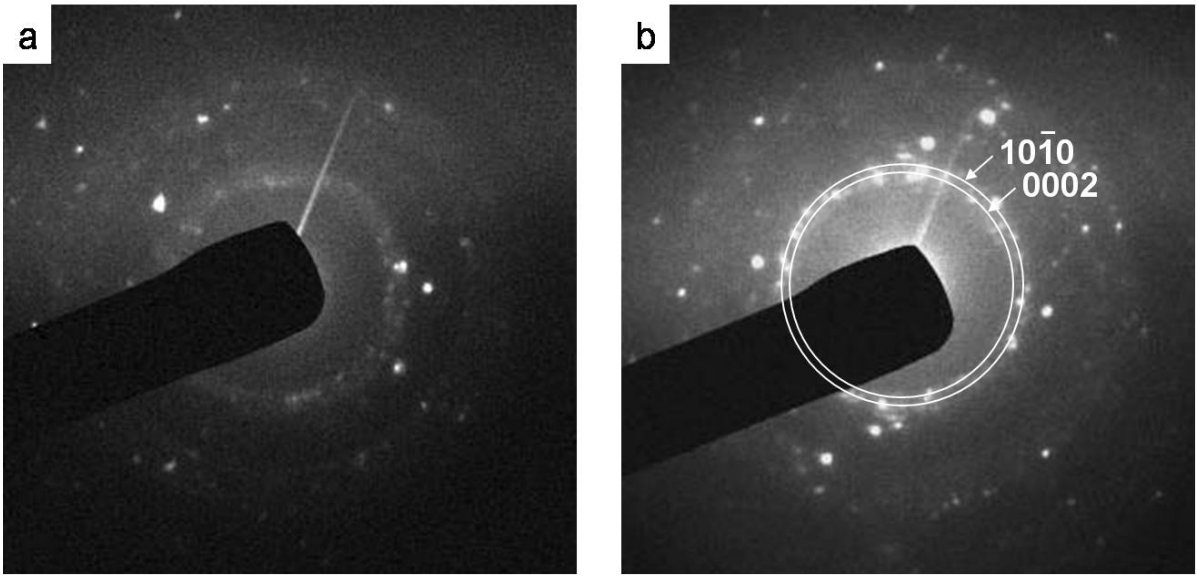

Figure S2. Transformation of Zn from liquid into solid. (a) Selected area electron diffraction pattern indicates that the contact part of the Zn nanorod is liquid because of the local Joule heating induced by applying a bias voltage. (b) When the molten region is moved from the Zn/ZnO interface by the tip manipulation, the liquid Zn transforms into solid Zn nanocrystals which is identified by the spots of $\{10\bar{1}0\}$ and $\{0002\}$ planes of hexagonal Zn.

Supporting Movies

Movie S1 (Movie S1.avi) *In situ* TEM movie shows that a Zn nanodot is grown by thermally assisted electromigration of Zn ions to the negatively biased tip (corresponding to inserted TEM images of Figure 2 in the article). The movie plays 4 times slower than the real time. The tip and sample are temporarily shaken as soon as the biasing tip is contacted with ZnO surface because of surface breakdown.

Movie S2 (Movie S2.avi) *In situ* TEM movie shows a fabrication of a Zn nanowire with the tip withdrawing rate of ~4.5 nm/s (corresponding to Figure 4a in the article).

Movie S3 (Movie S3.avi) *In situ* TEM movie shows a fabrication of a Zn nanorod with the tip withdrawing rate of ~0.7 nm/s (corresponding to Figure 4b in the article). Arrows indicate the molten regions. The movie plays 16 times faster than the real time.