

## **Description of Additional Supplementary Files**

**Supplementary Movie 1:** The defect-mediated ripening process of Cd-CdCl<sub>2</sub> core-shell particles. The play rate is 50 frames/s.

**Supplementary Movie 2:** The dissolution of Cd core without the protection of CdCl<sub>2</sub> shell. The play rate is 50 frames/s.

**Supplementary Movie 3:** The dissolution of Cd core with the protection of CdCl<sub>2</sub> shell. The play rate is 50 frames/s.

**Supplementary Movie 4:** The structural evolution of shell before the formation of crack defects and the directional growth of the core. The play rate is 50 frames/s.

**Supplementary Movie 5:** The formation of Cd-CdCl<sub>2</sub> core-shell nanostructured particles in the growth solution. The play rate is 50 frames/s.

**Supplementary Movie 6:** The states of Cd-CdCl<sub>2</sub> core-shell before ripening.