

Trioctylphosphine-assisted morphology control of ZnO nanoparticles

홍윤건, 조건희, 박윤수, 하돈형[†]
중앙대학교
(dhha@cau.ac.kr[†])

This study investigates the morphological change in colloidal ZnO NPs synthesized with TOP. The addition of TOP to the synthesis causes an evolution in the shape of ZnO NPs to tadpole-like particles from quasi-spherical particles at 300°C. The total length of the tadpole-like ZnO NPs can be modified by controlling the molar ratio of TOP to OLAM. The tadpole-like particles are elongated as the concentration of TOP increased but decreased when the addition of TOP is excessive. These tadpole-like ZnO NPs transform to quasi-spherical NPs regardless of TOP amounts at a reaction time of 3h at 300°C. At 200°C, the effect of TOP on the ZnO NP synthesis differs from that at 300°C. The ZnO NPs synthesized by controlling the molar ratios of surfactant ligands (TOP:OLAM=2:100 and 70:100) at 200 °C share amorphous, while a crystalline ZnO phase is formed when the reaction time is 3h. XPS spectra shows that TOP influences the oxidation of ZnO and suggests that a combination of OLAM and TOP plays a role in controlling the shape of ZnO NPs. These results provide critical insights to the utilization of TOP for a shape controlling ligand in ZnO NPs and suggest a new route to design oxide NPs.