

# Preparation and characterization of coordination polymer particles with various aspect ratio

Soo-Keun Lee, Sunhye Kim, Sang Kyoo Lim

Division of Nano-Bio Technology, Daegu Gyeongbuk Institute of Science and Technology (DGIST),  
Samsung Financial Plaza, Duksan-dong 110, Jung-gu, Daegu 700-010, Korea  
[laser@dgist.ac.kr](mailto:laser@dgist.ac.kr)

Coordinated polymer particles (CPPs) have attracted a great attention because of their high surface area and fundamentally interesting unique structure, which allow for applications in non-linear-optics,[1] catalysis,[2] gas storage,[3, 4] and molecular recognition.[5] A sophisticated understanding of coordination polymer particle formation, as well as the concomitant size and shape control, is crucial for the practical application of these materials. However, the fine control of CPP shape has not been well studied. Herein we report the formation of rod shaped bimetal(In and Sn) coordinated polymer particles and control of their aspect ratio(4 to 20).

The rod shaped bimetal coordinated materials were synthesized by the following process: 1,4-benzenedicarboxylic acid (TPA) was dissolved in N,N-dimethylformamide(DMF) and methanol, and DMF containing  $\text{InCl}_3$  and  $\text{SnCl}_4$  was added to the prepared solution. The resulting mixture was heated at  $100\text{ }^\circ\text{C}$  for 4 hours. The product generated in this time was isolated by cooling the reaction mixture to room temperature, collecting the precipitate by centrifugation, and washing several times with DMF and methanol. Field-emission scanning electron microscopy (SEM) images of In/Sn-CPP (Figure 1a) reveal rod formation with various length ( $\sim 100\text{ nm}$  to  $\sim 10\text{ }\mu\text{m}$ ). The chemical composition of In/Sn-CPP was determined by energy dispersive X-ray (EDX, Figure 1b) spectroscopy. The IR spectrum of In/Sn-CPP confirms the coordination of the carboxylate groups of TPA to metal ions, as evidenced by a shift in the CO stretching frequency to lower frequency compared to the CO stretching frequency for the uncoordinated TPA. The resulting In/Sn-CPP was found to be thermally stable to  $460\text{ }^\circ\text{C}$ , by thermogravimetric analysis. Furthermore, TGA data reveal that no significant guest molecules are involved in In/Sn-CPP after conventional vacuum treatment, as evidenced by no substantial weight loss until  $460\text{ }^\circ\text{C}$ . The aspect ratios of the rod shaped In/Sn-CPP were varied by changing the added amount of methanol. The more added methanol produced the lower aspect ratio materials. The reason for this phenomenon may relate with the amount of nuclei formation with different solvent conditions. The effect of such parameters upon the particle size was rationalized on the basis of crystal growth mechanism.

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## References

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## Figures

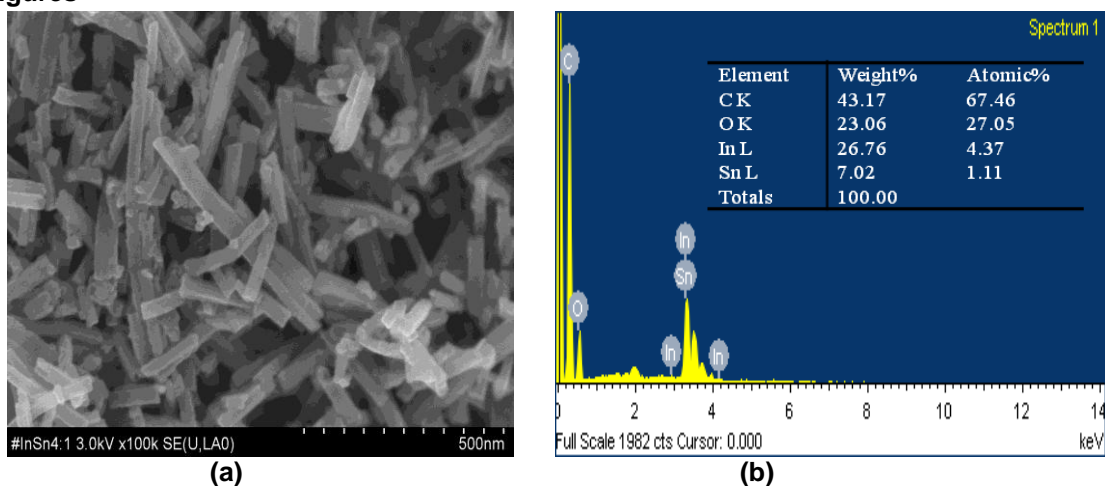


Figure 1. SEM image and EDX spectrum of In/Sn-CPP.