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Ionic liquid-bifunctional modulated aggregate-coalescence mechanism to synthesize SnSe single-crystalline nanorod / nanoparticles core shell nanostructures and single-crystalline nanorods for optoelectronics

Guofeng Zhang[a], Wenhao Luo[a], Qing Qin[a], Yanxia Liu[a], Cen Jin[a], Jing Hao[a], Jing Zhang[a], Wenjun Zheng[*ab]

[a] Department of Chemistry, Key Laboratory of Advanced Energy Materials Chemistry (MOE), TKL of Metal and Molecule-based Materials Chemistry, College of Chemistry, Nankai University, Tianjin 300071, P. R. China.

[b] Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), Nankai University, Tianjin 300071, P. R. China.

[*] Corresponding author:

E-mail addresses: zhwj@nankai.edu.cn

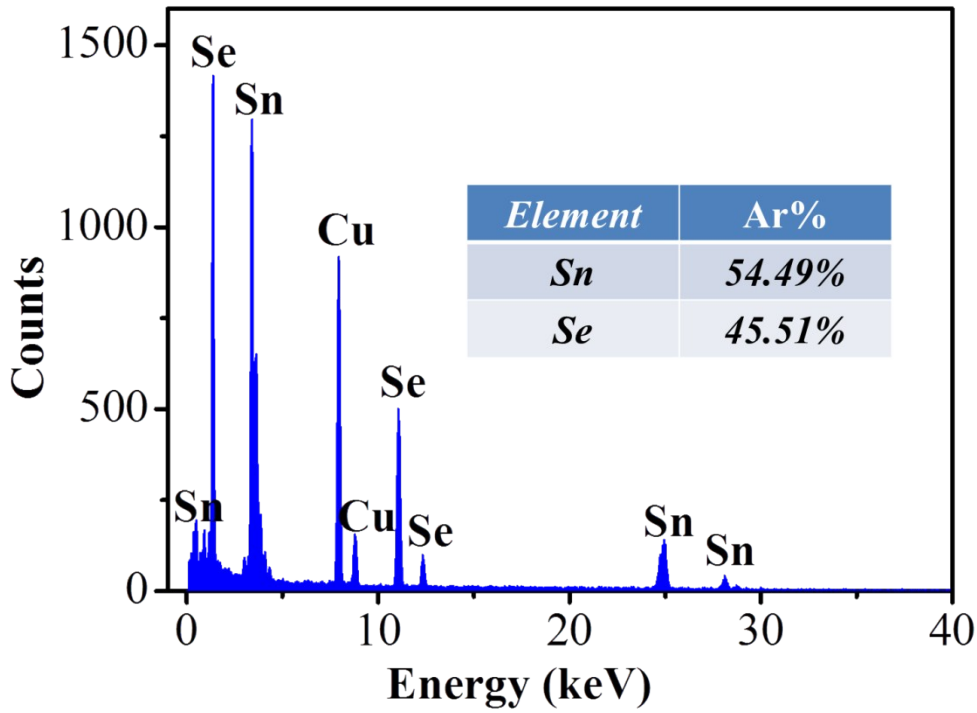

Fig. S1 EDS spectrum of the SnSe NRa. The atom ratio of Sn/Se was quantified to be 54.49/45.51 excluded Cu. The Cu content in the EDS spectrum was from the Cu grid.

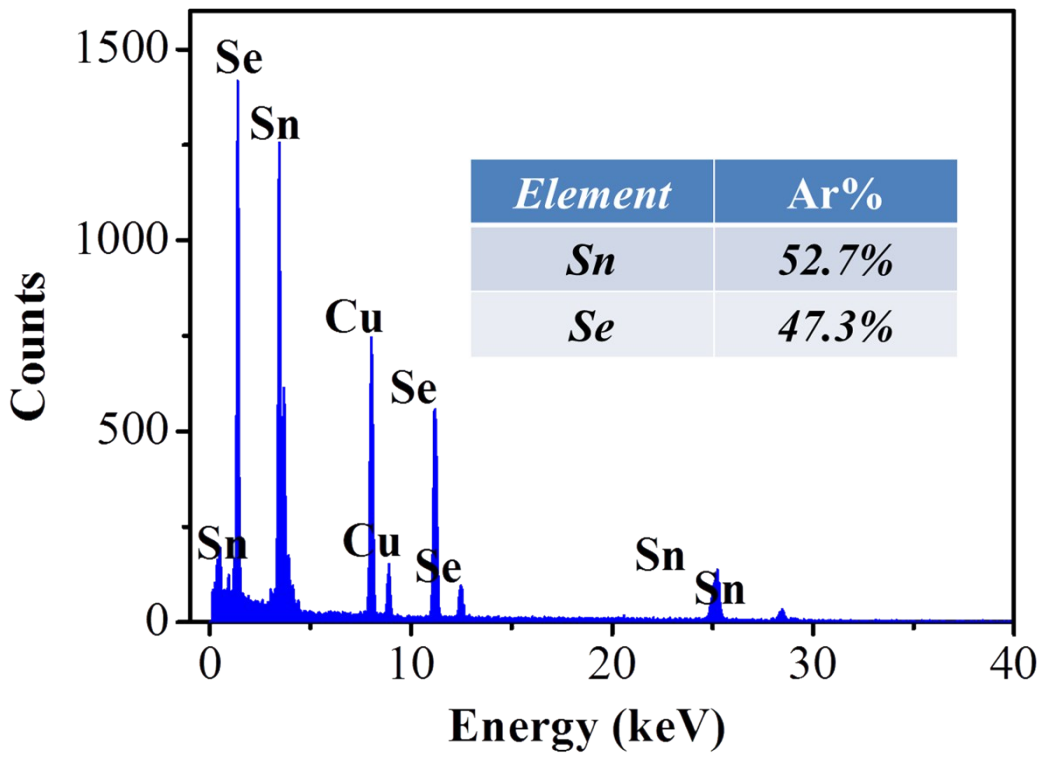

Fig. S2 EDS spectrum of the SnSe NR. The atom ratio of Sn/Se was quantified to be 52.7/47.3 excluded Cu. The Cu content in the EDS spectrum was from the Cu grid.

Fig. S3 Optical photograph of the transparent solution of $SnCl_2.2H_2O$ and Se dissolved in the mixture of [Bmim]Cl, ethanediamine and ethanol.

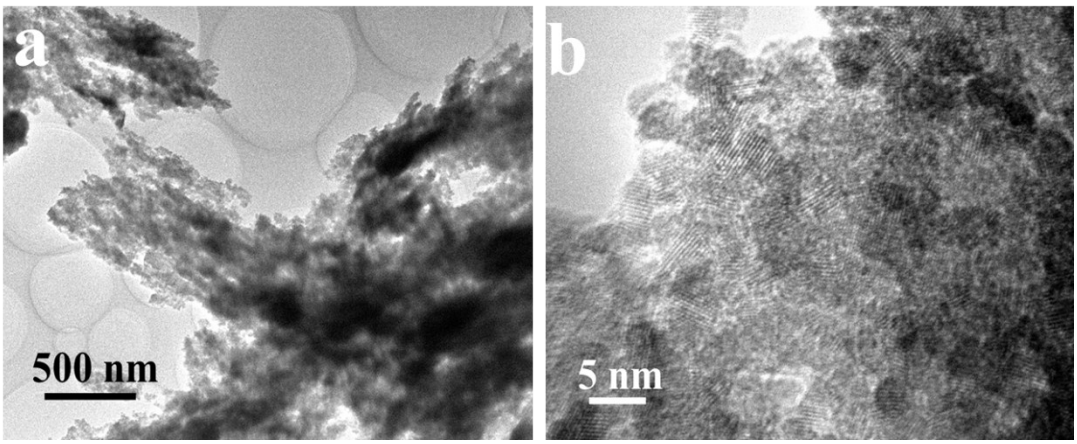

Fig. S4 a) TEM image and b) HRTEM image of the products obtained as the reaction processed to 2 h, numerous nanoparticles have begun to assemble into 1D assembly.

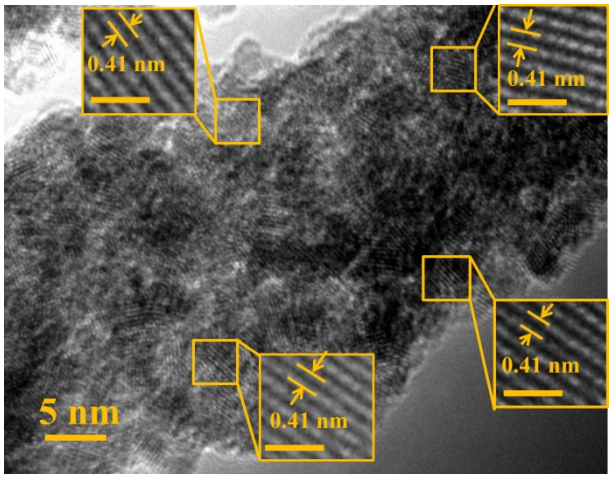

Fig. S5 HRTEM image of 1D assembly, dominated by (101) lattice spacing

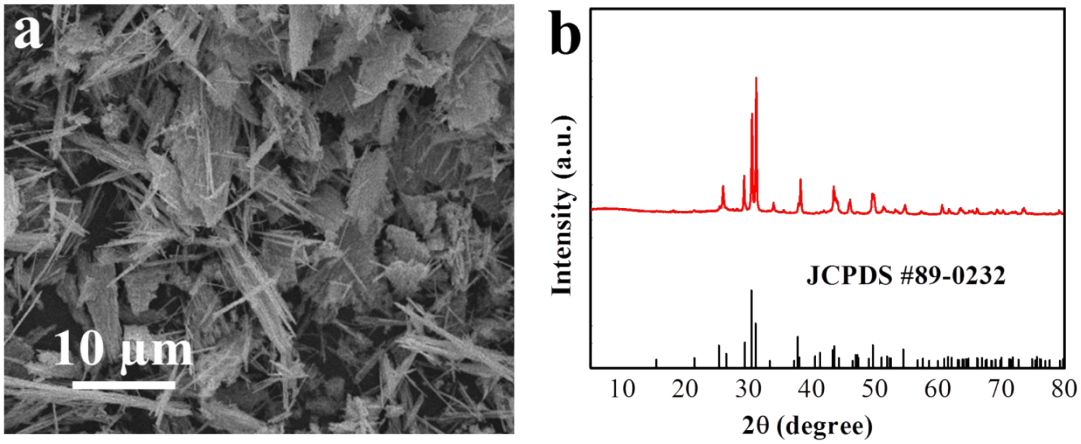

Fig. S6 a) SEM image and b) XRD pattern image of nanorafts obtained as the reaction processed to 16 h, some nanorods have been exfoliated off from the nanorafts.

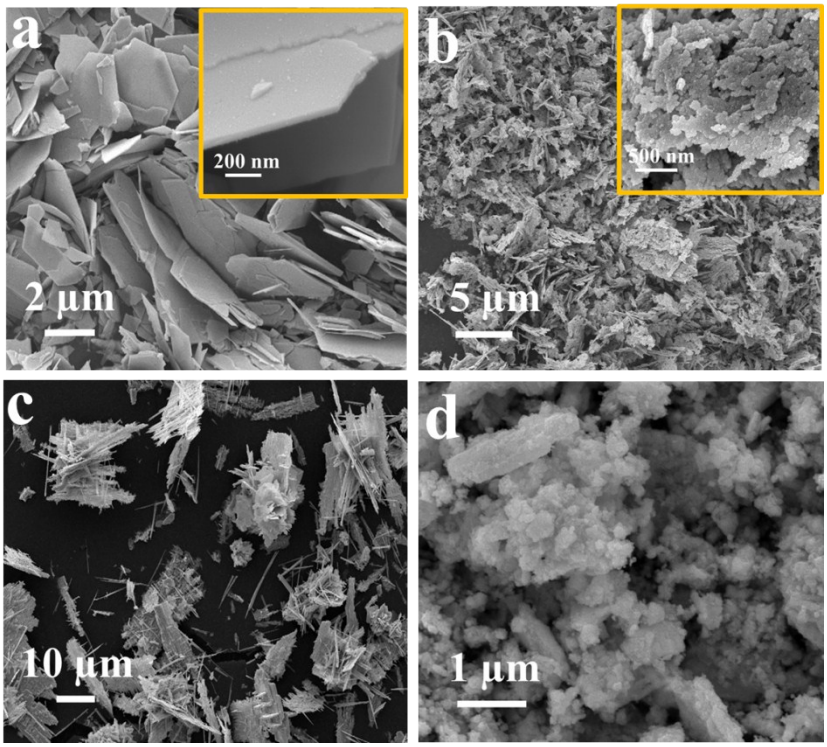

Fig. S7 SEM images of the products obtained for the same reaction time of 12 h distinguished by the added amount of [Bmim]Cl a) 0 g, b) 2g, c) 8g, d) 10 g.

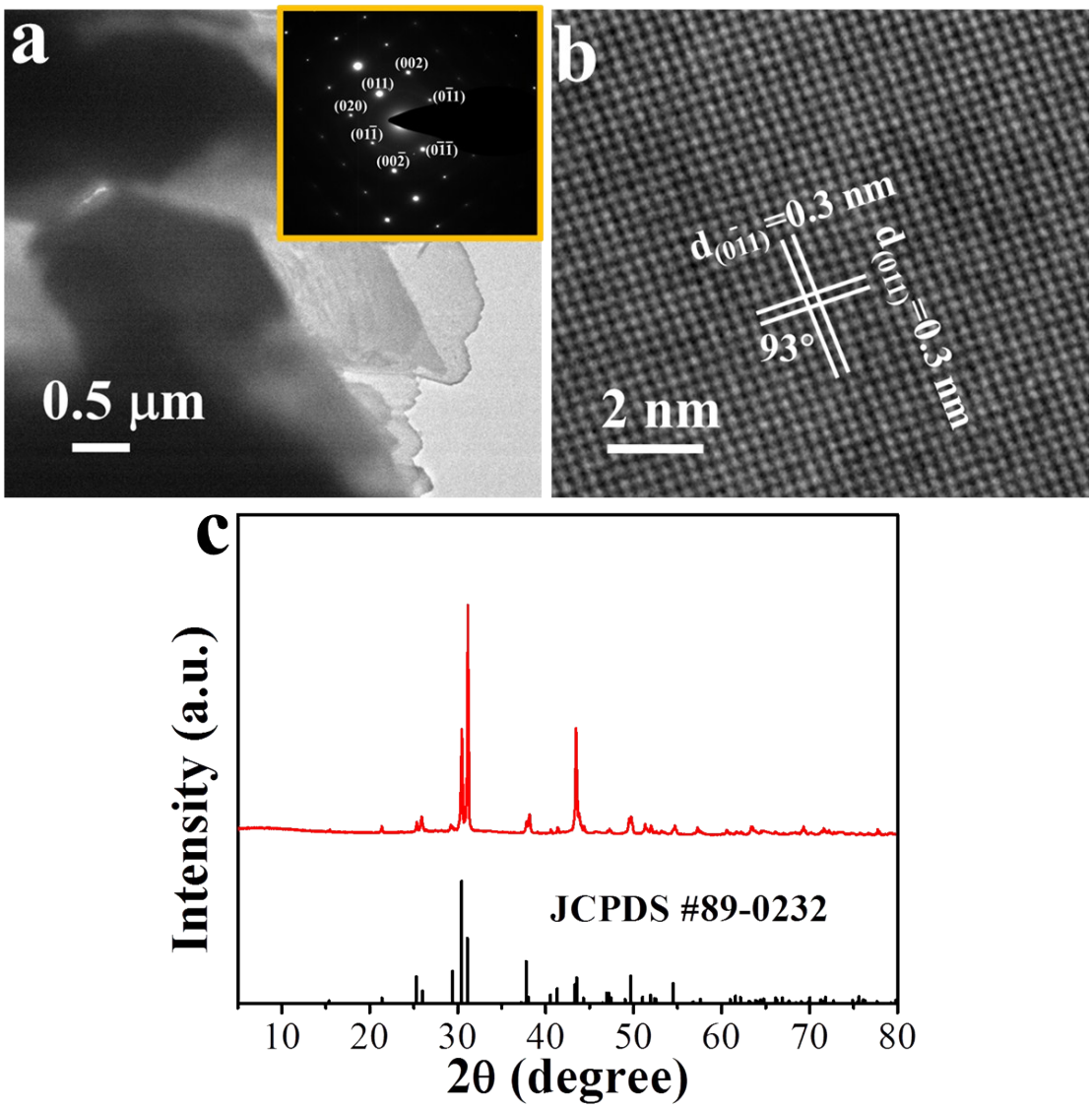

Fig. S8 a) TEM image, insert for SAED image, b) HRTEM image and c) XRD pattern of SnSe nanoplates.

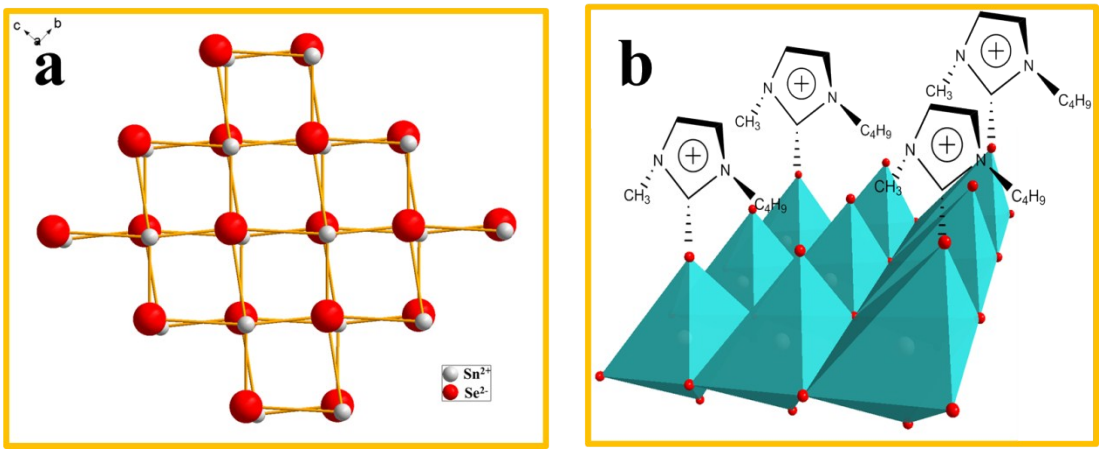

Fig. S9 a) Structure of orthorhombic SnSe viewed along the [100] direction, b) Scheme for $[Bmim]^+$ ions perpendicular to the {100} planes of SnSe and self-assembled into ordered structures through π–π stacking.

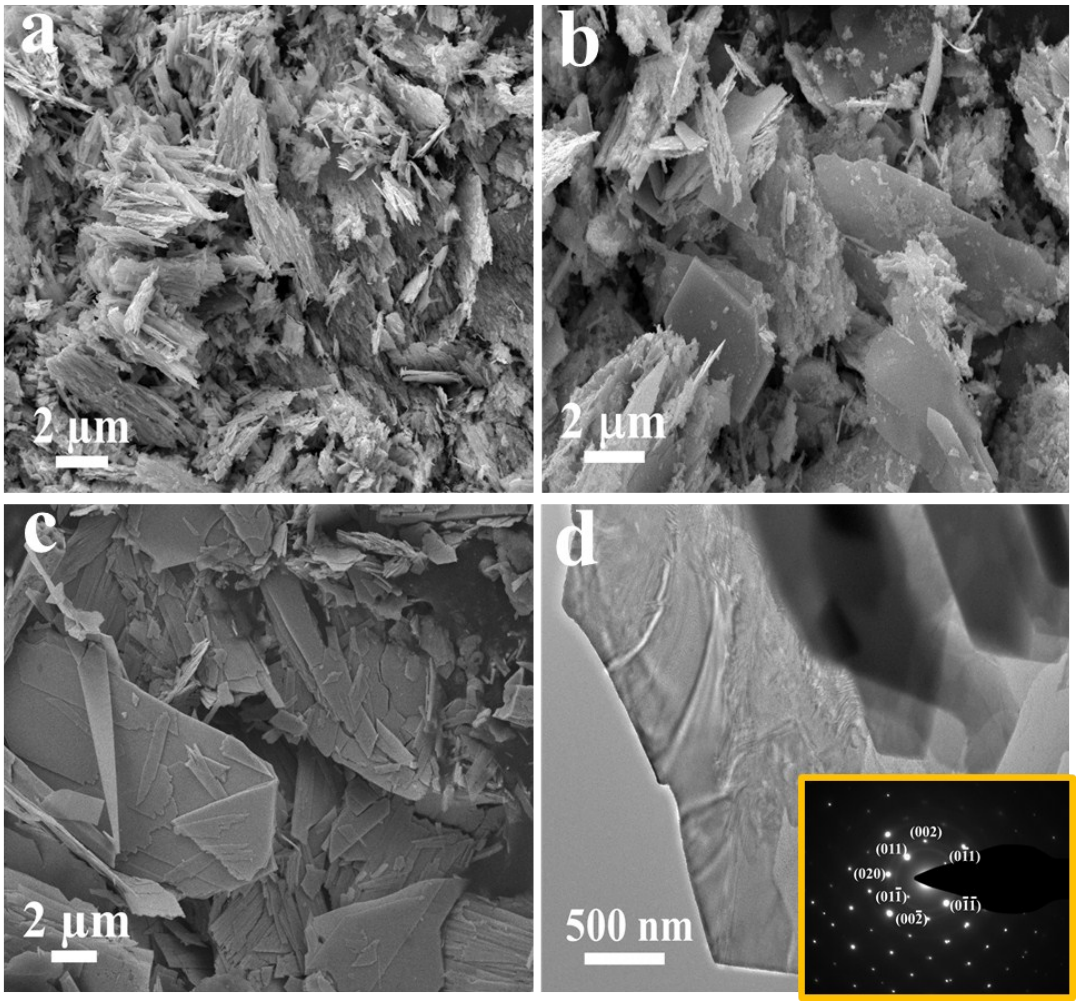

Fig. S10 a) SEM image of the 1D assembly obtained in the synthesis process of SnSe nanorafts at 4 h. SEM images of the products after the 1D assembly reacting for b) 4 h and c) 8 h in the absence of [Bmim]Cl. d) TEM image of the products for c, insert is the corresponding SAED image**.**