

## Electronic Supplementary Information

### Controlled growth of triangular AuCu alloy nanostars and high photocatalytic activities of AuCu@CdS heterostars†

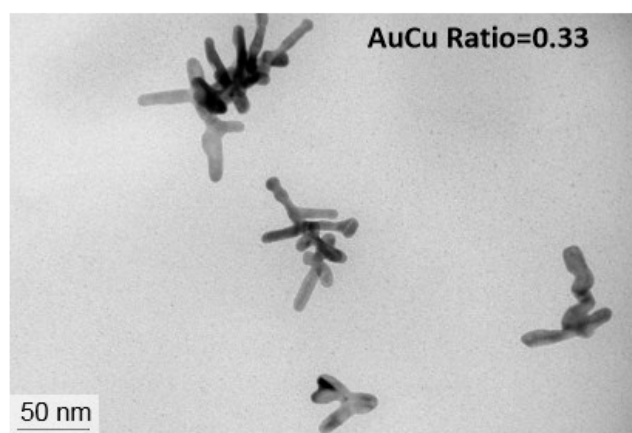
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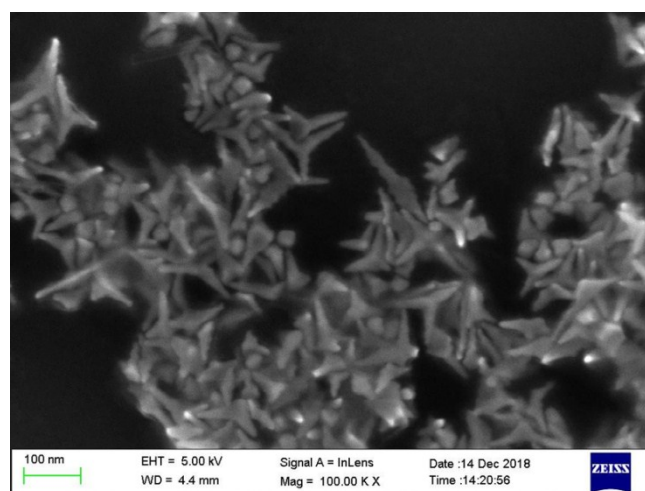
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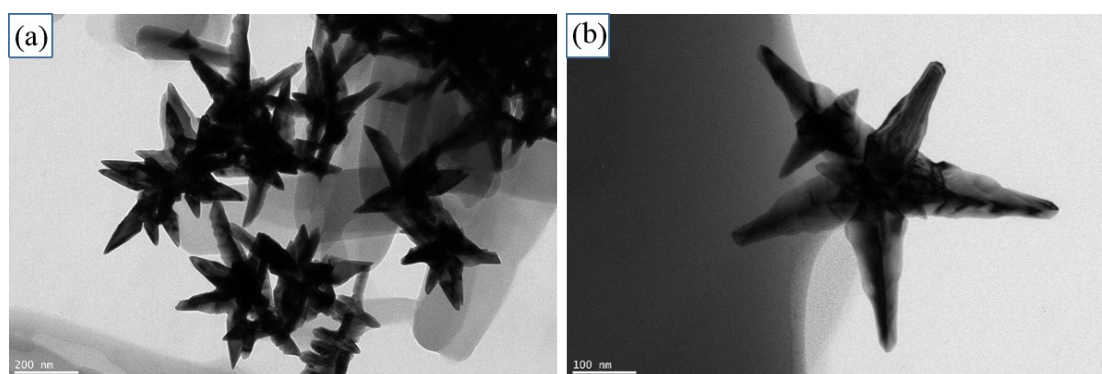
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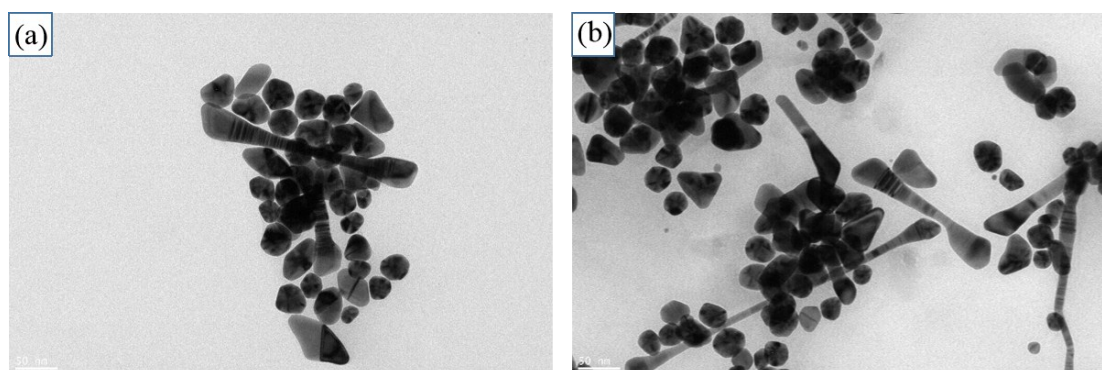
**Fig. S1** TEM image of irregular multibranches AuCu nanocrystals synthesized at  $\gamma_{\text{Cu}} = 0.75$  under 50 mg HDA.



**Fig. S2** SEM image of a triangular AuCu nanostars synthesized at  $\gamma_{\text{Cu}} = 0.36$  under 50 mg HDA.



**Fig. S3** (a) TEM image of pentacle AuCu nanostars synthesized at  $\gamma_{\text{Cu}} = 0.5$  under less amount of HDA (40 mg). (b) TEM image of a typical individual pentacle AuCu nanostar with the secondary dendrites which size is around 450 nm.



**Fig. S4** (a)(b) The TEM images of clava AuCu nanocrystals synthesized at  $\gamma_{\text{Cu}} = 0.28$  under 50 mg HDA.