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Highly uniform metallic and metal alloy nanocrystals, and their superlattices

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We present cost-effective and fast solution-processed synthesis of metallic and metal alloy nanocrystals with accurate size and composition control. In particular, we prepare Bi, In, In(1-x)Snx, Sn, and Ga nanocrystals. The average size of nanocrystals can be tuned in wide range for each material by means of reaction parameters: growth temperature, time, and precursor concentrations. Furthermore, we achieve unprecedented size distributions (e. g. 2.2% for In and In(1-x)Snx nanocrystals), allowing us to create long-range ordered 2D and 3D nanocrystal superlattices. Obtained materials might find their applications in catalysis, electrochemical energy storage as well as in shape-memory devices. Nanocrystal superlattices can be considered as porous material for effective gas adsorption process.

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