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Domain-confined growth of hollow semiconductor nanocrystals indcued by an electron beam LUPING TANG, LONGBING HE, LITAO SUN, Southeast University — Design and synthesis of hollow nanocrystals (NCs) have been rapidly developed due to their large surface area, low density and high loading capacity. In this paper, we report a domain-confined growth of hollow CdSeS NCs through both thermal treatments and electron beam irradiation on the templating CdSe/CdS NCs. We demonstrate that sublimation and regrowth of the NCs can be well controlled by the heating temperature and beam irradiation. With a preformed thin carbon shell on the templating NCs, transformation of the partically sublimated CdSe/CdS NCs into hollow CdSeS can also be restricted inside the shell's inter space. Furthermore, the regrowth of hollow CdSeS NCs is found to be sensitive to the volume ratio of the remained CdSe/CdS core to the carbon sphere. Only a certain portion of the CdSe/CdS cores can be successfully converted into hollow NC structures. These physical manipulations of NCs indicate that the electron beam has unique superiority over other techniques on farbication of nanostructures. Especially for individual NCs, such an ability of electron beams enables discrepant tailoring of their structures, and thereby to some extent shed light on in-situ design and construction of NC based nanodevices.

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