

Abstract Submitted
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High-Pressure Nanocrystals: New Structure and New Phase Transition Sequence¹ BO ZOU, State Key Laboratory of Superhard Materials, Jilin University, Changchun 130012, China — High-pressure studies offer a potential strategy to the synthesis of nanocrystals with new phases, and provide new insights into the phase stability in metastable NCs. We have studied the stability of metastable ZB- and WZ-MnS NCs under high pressure and found ZB-nanoparticles and ZB/WZ-nanobipods are stable below 5.3 and 2.9 GPa, respectively. With further compression, all these metastable MnS NCs directly convert to the stable RS-MnS. The WZ-CuGaS₂ nanocrystals undergo a transition to another disordered RS phase above 15.9 GPa, which is stable up to 30.3 GPa. Upon release of pressure, the sample was irreversible and intriguingly converted into the energetically more favorable and ordered Chalcopyrite (CH) structure. The YPO₄ nanoparticles exhibit a distinct transition sequence: zircon to scheelite phase (~18 GPa) without the metastable monazite phase. Additionally, this transition sequence was investigated on the YV_{1-x}P_xO₄ nanoparticles. The transition pressure is reduced with more VO₄ substituting for PO₄ units.

[1] *Nanoscale*, 2012, 4, 7443

[2] *JPCC*, 2012, 116, 3292

[3] *JPCC*, 2012, 116, 24837

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