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Highly-Quality Sodium Rare-Earth Fluoride Nanocrystals: Controlled Synthesis and Optical Properties. — High-quality α- and β-phase $NaLnF_4$ (Ln: Pr—Lu, Y) nanocrystals (nanopolyhedra, nanorods, nanoplates, and nanospheres) and $NaYF_4$:Yb,Er/Tm nanocrystals (nanopolyhedra and nanoplates) are synthesized by co-thermolysis of CF_3-CO-ONa and $(CF_3CO\text{-}O)_3Ln$ in oleic acid/oleylamine/1-octadecene solution (250—330 °C, 60—70% yield). The samples are characterized by powder XRD, TEM, and room temperature fluorescence spectroscopy. The phase, shape, and size of the nanocrystals are manipulated by tuning the Na/Ln ratio, solvent composition, and reaction temperature and time. Sodium rare-earth fluorides exhibit unique luminescent, ferromagnetic, insulating/magnetic, and piezoelectric properties and are important for applications in solid state lasers, three-dimensional flat-panel displays, and low-intensity IR imaging. — (MAI, H.-X.; ZHANG*, Y.-W.; SI, R.; YAN, Z.-G.; SUN, L.-D.; YOU, L.-P.; YAN, C.-H.; J. Am. Chem. Soc. 128 (2006) 19, 6426-6436; State Key Lab. Rare Earth Mater. Chem. Appl., Peking Univ., Beijing 100871, Peop. Rep. China; Eng.) — W. Pewestorf