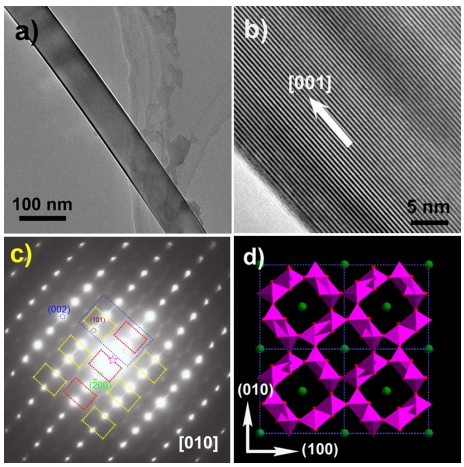
多元氧化物微纳米结构

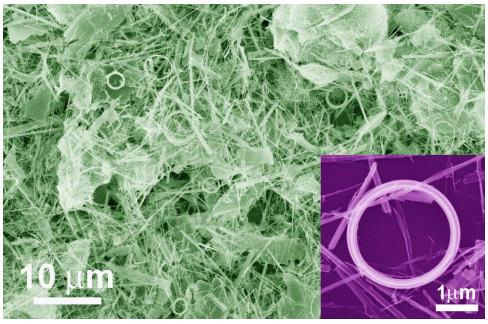
Complex oxide micro-/nano-structures

提出了一种新颖的熔盐法合成了一系列碱金属钛酸盐和铌酸盐一维纳米材料($Na_2Ti_6O_{13}$、$KTi_8O_{16.5}$、$K_2Ti_6O_{13}$、$K_2Nb_8O_{21}$、KNb_3O_8等)，实现了两种体系一维纳米材料形貌和物相的控制，揭示了复杂氧化物体系温度控制的晶体生长行为，为复杂氧化物一维纳米材料的大规模生产提供了一种可行工艺。利用 Ostwald 熟化机制，首次获得了一系列 ABO_4 型金属氧化物空心微球，如 $CaWO_4$、$CaMoO_4$ 和 $CdMoO_4$，证实了 Ostwald 熟化机制可以用来合成多元化合物空心结构，为无模板法合成其空心微纳米结构提供了切实可行的途径。以上工作发表于 J. Am. Chem. Soc.、Cryst. Growth Des.、J. Phys. Chem. B/C 等著名期刊。

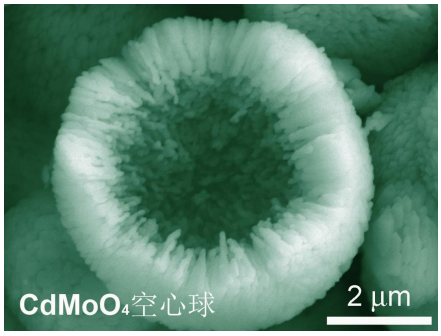
A novel molten salt approach was developed to the morphology-controllable synthesis of alkali titanate and niobate one-dimensional nanostructures, for example, $Na_2Ti_6O_{13}$, $KTi_8O_{16.5}$, $K_2Ti_6O_{13}$, $K_2Nb_8O_{21}$, KNb_3O_8 nanowires or nanobelts. The temperature-dependent crystal growth behavior of complex oxides was well depicted. A series of ABO_4-type metal oxide hollow microspheres, such as $CaWO_4$, $CaMoO_4$ and $CdMoO_4$ was firstly synthesized via Ostwald ripening process. This demonstrates Ostwald ripening process is a straightforward method for the template-free synthesis of hollow structures. The results above have been published in journals of J. Am. Chem. Soc., Cryst. Growth Des., J. Phys. Chem. B/C.



$KTi_8O_{16.5}$ 纳米线的形貌及结构表征
Structure characterization of $KTi_8O_{16.5}$ nanowires



$K_2Ti_6O_{13}$ 纳米环。纳米环由单根纳米带卷曲形成
$K_2Ti_6O_{13}$ nanorings formed by self-spiraling of a nanobelt



$CdMoO_4$ 空心微球。空心微球由纳米棒组成
$CdMoO_4$ hollow microspheres consist of nanorods assembly