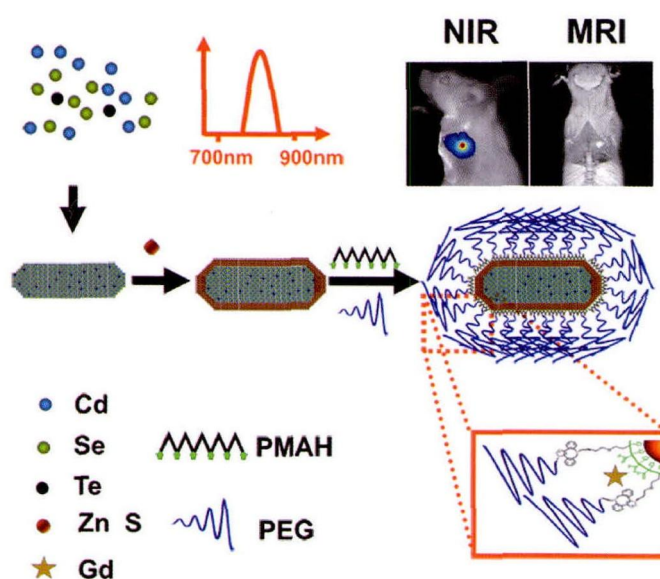


## A potential multifunctional nano-platform based on compact alloyed quantum rods for *in vivo* multimodal imaging

Challenges in diagnostic imaging have led to an explosion of interest in combining modalities to more accurately interpret disease and abnormalities *in vivo*. Magnetic resonance imaging (MRI) and near-infrared optical imaging (NIRF) are highly complementary imaging techniques. Combining these methods would therefore have significant advantages and may be realized through the use of nanomaterials. Semiconductor nanocrystals have emerged as an important class of nanomaterials because of their tunable optoelectronic properties that arise from size, shape and composition. More recently, the rod architecture, also known as quantum rods (QRs), has been achieved. With the support by the National Natural Science Foundation of China and the Ministry of Science and Technology, the research team led by Prof. Cai Lintao at the Shenzhen Institutes of Advanced Technology (Chinese Academy of Sciences) developed a promising strategy for engineering multifunctional imaging nanoprobcs with the stable near-infrared QRs, which was recently published in *Advanced Functional Materials* (2014, 24, 25: 3897).

Based on the previous research progress in the synthesis and modification of near-infrared quantum dots (*Nanoscale*, 2011, 3: 4724–4732; *J Am Chem Soc*, 2012, 134: 8388–8391), Gao Duyang and Zhang Pengfei from Cai's group developed a reliable synthetic approach for CdTe<sub>x</sub>Se<sub>1-x</sub>/ZnS alloy nanocrystals to achieve high brightness (quantum yields up to 80%) with controllable rod-shape and near-infrared (650–870 nm) emission. Taking advantage of combined optical imaging and MRI, paramagnetic Gd<sup>3+</sup>, the MRI contrast agent that is commercially available and clinically complementary, was then conjugated to the surface of QRs by the interaction between metal ions and high-density ligands to produce dual-modal QRs. The dual-modal nanostructure was applied for *in vivo* fluorescence and magnetic resonance lymph node imaging. Moreover, other functional ions might also be assembled with the QRs, through which a potential nano-platform was supplied for designing multifunctional nanostructure.



**Figure** Schematic illustration of the multifunctional quantum rods for multimodal imaging by SIAT.