Hybrid heteronanocrystal for redox-responsive T1/T2 dual-mode magnetic resonance imaging

김명훈, 손혜영[1], 김가윤, 허용민[1], 함승주†
연세대학교; [1]연세의료원
(haam@yonsei.ac.kr†)

Dual-mode contrast agents (DMCA) for T1- and T2-weighted magnetic resonance (MR) imaging have drawn extensive interest for their ability to improve diagnostic accuracy by providing two complementary and reliable data within single instrument. Herein, we developed an environment-responsive imaging nanosystem based on the hybrid hetenanocrystals functioning magnetic relaxation switch (MRS) for T1/T2 dual-mode MR imaging. The nanoprobes were synthesized by epitaxial growth of redoxable paramagnetic shells on the surface of superparmagnetic cores using thermal decomposition method. Mn_3O_4 shells were introduced to the nanoplatform to minimize the water proton interaction with the nanoprobe in normal condition before both immediate dissolution generating high-spin Mn^{2+} ions and MRS activation under intracellular reducing environment. We investigated the OFF/ON operation mechanism of MRS according to glutathione (GSH) levels on in vitro test, and confirmed the feasibility of the nanoprobes for in vivo T1/T2 MR imaging of tumor-bearing mice.