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Multifunctional mesoporous silicon nanoparticles modified with dieckol/graphene oxide bi-layers for PH/NIR-controlled drug release and remarkable targeting anticancer mitochondria**Anh-Vy Tran, Sang-Wha Lee, Giau Van Vo, Seong Soo A An and Thu-Thao Thi Vo**
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Mesoporous Silicon nanoparticle (MPSi) has received considerable attention in the field of biomedical nanotechnology. The new approach for a complete magnesiothermic reduction of mesoporous silica provides a foundation for the rational design of silicon nanostructures. The outstanding properties of MPSi with an excellent *in vitro* biocompatibility and biodegradability have led to the biomedical applications of MPSi including delivery of therapeutic agents. Dieckol, belonging to a particular kind of natural polyphenols called phlorotannins, is isolated from several brown algae of genus *Eisenia* and *Ecklonia*. Dieckol has been published to exhibit various biological activities, such as anti-inflammatory, antioxidative, hepatoprotective, anti-diabetic, anti-allergic, anti-viral and anti-cancer activities. Graphene Oxide (GO) possesses unique features, such as high dispersibility in water as well as in physiological environments, excellent biocompatibility and easily tunable surface functionalization, which are emerged as highly promising materials for targeted drug delivery. Mitochondria are ATP-generating organelle. In addition to cellular energy production, mitochondria also participate in regulating intracellular calcium homeostasis, generating reactive oxygen species, activating intrinsic apoptotic pathway and producing hormones. Therefore, mitochondria have implications for various diseases. Remarkably, those nanoparticles loaded MPSi seemed to be no obvious toxicity to HEK293 normal cells. Furthermore, the exhibited more enhanced cancer cell killing efficiency among as-prepared samples, consequently leading to the decrease in cellular ATP production and mitochondrial membrane potential. Taken together, the current synthesized mitochondria-targeted delivery system would be promising application potential in delivering specific mitochondria-acting drugs.

Biography

Anh-Vy Tran is pursuing his PhD from Gachon University, Republic of Korea. He has published two papers in reputed journals.

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