

**Iron oxide and carbon-based nanomaterials for biomedical application****Katerina Polakova**

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Magnetic nanoparticles (NPs), especially SPIO nanoparticles, have long been used as MRI (magnetic resonance imaging) contrast agents and as advantageous nanoplatforms for drug delivery. In this talk, development of a new type of negative per-oral SPIO contrast agents for small bowel imaging will be presented and particular attention will be devoted to dual imaging of stem cells labeled by rhodamine-bound maghemite nanoparticles. Another promising nanomaterial in the bioimaging field today, represents the so called quantum dots (QDs). Here, the author will focus on in vitro characterization of carbon quantum dots (CQDs) which have been demonstrated as a new class of biocompatible fluorescent nanomaterials due to their fluorescence brightness, high photostability, good biocompatibility and unique photo-thermal properties. For the first time, we showed the accurate thermal sensing of tumor cells by measuring of life time decay of N, S co-doped CDs inside the cells. In another promising study, the author will show in vivo application of mesenchymal stem cells labeled by positively charged CDs and their homing into tumor tissue of immunodeficient NuNu mouse bearing subcutaneous PATU (human pancreatic adenocarcinoma) tumor.

**Recent Publications**

1. Cmiel V, Skopalik J and Polakova K (2017) Rhodamine bound maghemite as a long-term dual imaging nanoprobe of adipose tissue-derived mesenchymal stromal cells. *Eur Biophys J*. 46:433–444.
2. Kalytchuk S, Polakova K and Wang Y (2017) Carbon dot nanothermometry: intracellular photoluminescence lifetime thermal sensing. *ACS Nano* 11: 1432–14442.
3. Polakova K, Mocikova I and Purova D (2016) Magnetic resonance cholangiopancreatography (MRCP) using new negative per-oral contrast agent based on superparamagnetic iron oxide nanoparticles for extrahepatic biliary duct visualization in liver cirrhosis. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub*. 160:512–517

**Biography**

Katerina Polakova has broad experiences in nanomaterials for biomedical applications. She started her research on iron oxide nanoparticles, their synthesis and application as MRI per-oral contrast agent for small bowel imaging and stem cells labeling. Now, she is the Head of the bio-laboratory in RCPTM UP Olomouc in the Czech Republic where they are studying cytotoxicity of mainly carbon-based nanoparticles and together with synthetic chemists at RCPTM and collaborators they are developing carbon-based nanomaterials for theranostics applications.

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