Self luminescent iron oxide nanoparticles for imaging and gene delivery

<u>Özlem Ünal¹</u>, Havva Acar Yağcı², Rhoulla Hodadust³, Emre Erdem⁴, Barış Yağcı⁵

¹Material Science and Engineering, Koç University, Istanbul, Turkey ²Material Science and Engineering, Koç University, Istanbul, Turkey ³Material Science and Engineering, Koç University, Istanbul, Turkey ⁴Department of Physical Chemistry, University of Freiburg, Freiburg, Germany ⁵Material Science and Engineering, Koç University, Istanbul, Turkey

<u>*ounal13@ku.edu.tr</u>

Novel gene delivery and imaging agent based on branched polyethyleneimine (PEI) coated superparamagnetic iron oxide nanoparticles (SPIONs) was reported exhibiting strong intrinsic blue luminescent property based on the interaction of PEI with the surface of iron oxide nanoparticles.

Weak intrinsic blue florescence of PEI is known by the literature. Although exact mechanism behind this phenomenon was not clear, several attempts strongly show that there is not a single action behind the fluorescence of amino containing species ¹⁻³ In our study, it was observed that latter weak intrinsic fluorescence of branched PEI was enormously enhanced after coating on the surface of the iron oxide nanoparticles *in situ* and acidification steps. Unique fluorescence properties of superparamagnetic, colloidally stable and nano-sized PEI coated SPIONs was investigated with fluorescence spectroscopic and microscopic techniques with the comparison on self luminescence of free 25 kDa PEI analog.



Figure 1. Fluorescence properties of coated and free bPEI. (A) Preparation process of bPEI-SPION (B) Pictures of free bPEI (C) Absorbance calibrated PL spectrum of free bPEI, bPEI-SPION before acidification ,bPEI-SPION acidified with hydrochloric acid (bPEI-SPION-HCl) and acetic acid (bPEI-SPION-HAc) (D) PL spectrum of free bPEI and bPEI-SPION-HAc at pH5.

[1] Pastor-Pérez, L.; Chen, Y.; Shen, Z.; Lahoz, A.; Stiriba, S. E., 2007, 28 (13), 1404-1409.

[2] Chu, C. C.; Imae, T., Macromolecular rapid communications 2009, 30 (2), 89-93.

[3] Cao, L.; Jia, D.; Wang, S.; Rong, Y.; Liu, C.; Wang, D., Chemistry Letters 2014, 43 (2), 246-248