Cellular imaging by using a hybrid Silica-Europium complex

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Silica (SiO_2) particles are an interesting and versatile material because their surface can be modified to attend specific tasks by linking covalently a functional molecule[1]. Since they are biocompatible and show low cytotoxicity[2,3], they can be applied as biomarkers[4]. We report in this work the preparation of a hybrid material composed of Eu^{3+}-complex bridged through a Schiff Base (SB) to the SiO_2 surface, and its use for cellular imaging. Spheroidal shaped (220 nm) aminofunctionalized SiO_2 were synthesized by sol-gel hydrolysis of TEOS and APTES. The surface was modified by linking the amino groups with salicylaldehyde to form the SB, which was confirmed by FTIR spectrum. The SB-functionalized silica exhibits a broad emission band centered at 559 nm. Eu^{3+} ions were then coordinated on the surface of SiO_2 through the SB, followed by the change of the coordinated water molecules by dibenzoylmethane (DBM). The final hybrid, $Eu(DBM)_3(SB)$-SiO_2, kept the initial spherical form and size, but now emitting the characteristic Europium red light. These particles were suspended in phosphate buffer used to cultivate CHO ovary cells of hamsters to evaluate its cytotoxicity, confirming that they are non-toxic. In order to investigate their potential application for cellular imaging both CHO hamsters cells and striated muscle tissue skeletal hamster were cultivated in a buffer suspension of the hybrid. Confocal Laser Scanning Microcopy images for CHO cells, Fig. 1, reveal that the hybrid have crossed the cell membrane and are located into the cytoplasm with a higher concentration around the nucleus, Fig. 1(c). The same was observed for muscle tissue test, where red emission is observed in the cytoskeleton of the cells, Fig. 2(b). Some cells seem more susceptible than other, probably due to the high heterogeneity of this kind of cells, as seem in Fig. 2(c). Therefore, this hybrid is very promising to be applied as cellular biomarker and for cellular imaging.

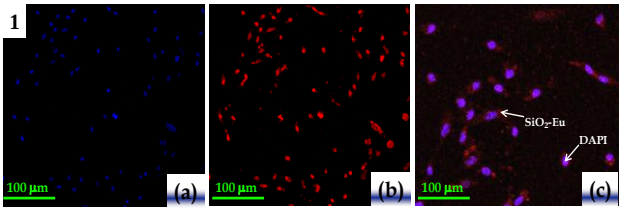

Figure 1 – Confocal images of CHO hamsters cells cultivated in a suspension of SiO_2-Eu sample. (a) Excitation with DAPI channel; (b) Texas red channel; (c) DAPI and Texas red channel.

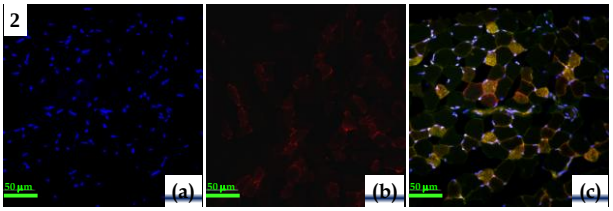

Figure 2 – Confocal images of striated muscle tissue skeletal of hamster (a) Excitation with DAPI channel; (b) Texas red channel; (c) DAPI, FITC and Texas red channel.

[1]AZEVEDO, C. B. et al. J. Fluoresc. 2015, 25. 433-440. [2]AL-RAWI, M, et al. *Inorganic Compounds*, 2011, 85, 813–826. [3]BAE, S. W. et al. *Chem. Comm.* 2012, 48, 2270–82. [4]ARMELAO, L. Coord. Chem. Rev. 2010, 254, 487-505.

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