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Pt(II)-metallosurfactants and metallosomes for chemotherepautic drug delivery

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Metallosurfactants (MTS) are tensioactive metal complexes that gather properties of both constituents: the surfactant and the metal ion.1,2 These molecules exhibit self-assembly properties and, when mixed with phospholipids, are able to form stable vesicles, known as metallosomes, which size ranges from nanoparticles to microns. They have been proposed as reliable and efficient tools for drug delivery systems in cancer treatment.3,4 Although platinum drugs are widely used in the treatment of several types of solid tumors, the inclusion of Pt chemotherapeutic agents in such vesicles is reported to enhance their biocompatibility and allows to reduce immunogenicity and non-specific toxicity, diminishing side-effects in front of the free drug.5,6

An unexplored Pt(II)-MTS family of linear anionic alkyl sulfonated ligands have been synthesised and fully characterised by several techniques (1H-NMR, 13C-NMR, 195Pt-NMR, ESI-MS, ICP-OES and ATR-FTIR). This particular MTS family bears the polar head group opposite to the coordinated Pt(II) centre, hence giving rise to a non-standard MTS structure.7 The aggregation properties of both, the amphiphilic ligands and the corresponding Pt(II)-MTS have been studied by DLS and UV-vis, as well as by optical microscopy and cryo-TEM. Tensioactive ligands have not shown a suitable hydrophilic/hydrophobic moieties ratio to form aggregates by themselves. However, the coordination of some of these ligands to Pt(II) moiety allows their assembly in the micron-range (Figure 1).

Mixed vesicles of Pt(II)-MTS and phospholipids at different concentrations have been obtained in aqueous media to study the Pt internalisation in the phospholipid bilayer and the metallosomes size.8 Finally, preliminary cytotoxic studies have shown the potentiality of these compounds to be used as promising anticancer lipodrug candidates.

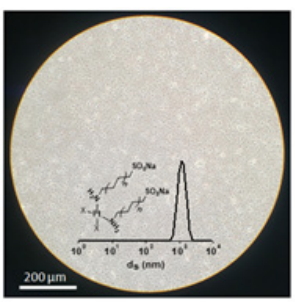

Figure 1: OM image and DLS plot of Pt(II)-MTS self-assembly and its structure representation

Recent Publications

1. E. Parera, F. Comelles, R. Barnadas and J. Suades, Langmuir, 2010, 26, 743–751.
2. R. Kaur and S. K. Mehta, Coord. Chem. Rev., 2014, 262, 37–54.

3. P. Garg, G. Kaur, G. R. Chaudhary, S. L. Gawali and P. A. Hassan, Phys. Chem. Chem. Phys., 2017, 19, 25764–25773.
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5. S. Zalba and M. J. Garrido, Expert Opin. Drug Deliv., 2013, 10, 829–844.
6. B. S. Pattni, V. V. Chupin and V. P. Torchilin, Chem. Rev., 2015, 115, 10938–10966.
7. M. Marín-García, N. Benseny-Cases, M. Camacho, Y. Perrie, J. Suades and R. Barnadas-Rodríguez, Dalt. Trans., 2018, 47, 14293–14303.
8. M. Marín-García, N. Benseny-Cases, M. Camacho, J. Suades and R. Barnadas-Rodríguez, Chem. Commun., 2017, 53, 8455–8458.

Biography

Glòria Garcia Ortega is a PhD student at the Universitat Autònoma de Barcelona whose work deals with lipo-based delivery systems for anticancer applications. The group where she stays focuses their research on the challenging area of bioinorganic chemistry (metallothioneins, synthesis of Cu and Pt chemotherapeutic complexes and metallosomes for biomedical applications). Her final Bachelor's degree project lied on the synthesis, characterization and application of metal and metal-oxides nanoparticles. After her Master's degree in Industrial Chemistry and Introduction to Chemical Research, she did an industrial research internship in order to develop nanocomposites for superconducting materials.

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