Engineering Delivery Platforms for Inorganic Agents

Cancer is projected to claim the lives of up to 24 million individuals worldwide by 2030, with potential costs exceeding 20 trillion euros by 2050 if no additional investments in research and prevention are done.1 Despite significant advancements in the development of chemotherapy agents combatting cancers, drug resistance and toxicity persist as substantial barriers. Inorganics, boasting a wider range of properties compared to organic drugs, emerge as promising candidates for acquiring specific functionalities,2 while polymer assemblies are more and more exploited for the delivery of such compounds.3

We will present the various strategies we have been working with for the delivery of inorganics such as boron and ruthenium complexes: physical encapsulation into polymeric micelles,4 chemical binding between inorganics and monomers or preformed polymers,5 ligand modification on ruthenium complexes.6 The influence of the prodrug system will be shown on both chemical and biological properties.

Références

(1) Fattal, E.; Tsapis, N. Nanomedicine technology: current achievements and new trends. *Clinical and Translational Imaging* **2014**, *2*, 77-87.

(2) Barry, N. P. E.; Sadler, P. J. Challenges for Metals in Medicine: How Nanotechnology May Help To Shape the Future. *ACS Nano* **2013**, *7*, 5654-5659.

(3) Yi, C.; Yang, Y.; Liu, B.; He, J.; Nie, Z. Polymer-guided assembly of inorganic nanoparticles. *Chem. Soc. Rev.* **2020**, *49*, 465-508.

(4) Pitto-Barry, A.; Lupan, A.; Ellingford, C.; Attia, A. A. A.; Barry, N. P. E. New Class of Hybrid Materials for Detection, Capture, and “On-Demand” Release of Carbon Monoxide. *ACS Appl. Mater. Interfaces* **2018**, *10*, 13693-13701.

(5) Wang, Y.; Pitto-Barry, A.; Habtemariam, A.; Romero-Canelon, I.; Sadler, P. J.; Barry, N. P. E. Nanoparticles of chitosan conjugated to organo-ruthenium complexes. *Inorg. Chem. Front.* **2016**, *3*, 1058-1064.

(6) Azmanova, M.; Rafols, L.; Cooper, P. A.; Seaton, C. C.; Shnyder, S. D.; Pitto-Barry, A. Anticancer Water-Soluble Organoruthenium Complexes: Synthesis and Preclinical Evaluation. *ChemBioChem* **2022**, *23*, e202200259.