

Design of nanoshuttles for theranostics

Enza Torino

Dept. of Chemical, Materials and Production Engineering, University "Federico II", Naples, Italy

Istituto Italiano di Tecnologia, - Center for Advanced Biomaterials for Healthcare, Naples, Italy

Interdisciplinary Research Center on Biomaterials, University "Federico II", Naples, Italy

The introduction of nanotechnology has led to the development of many medical applications including the formulation of new nanosystems that can be used for theranostic applications. The resulting nanovectors, capable of diagnosis, drug delivery and monitoring of therapeutic response, are expected to play a significant role in the dawning era of personalized medicine, and much research effort has been devoted toward that goal. Recently, growing interest in the design of polymer architectures as diagnostic probes for Magnetic Resonance Imaging (MRI) to overcome the limitations of commercial Contrast Agents (CAs), namely low relaxivity, paved the way to new strategies for increasing CA's efficacy [1, 2, 3]. However, the mechanism governing the interaction between biopolymers and CAs are still under investigation. Here, we aim to understand the basis of the relaxation enhancement in polymer CAs, and we show how biopolymer properties can impact on the design of nanostructured CAs. A library of nanostructures is proposed to apply in therapy and diagnosis.

References

- [1] Courant, T., Roullin, G.V., Cadiou, C., Callewaert, M., Andry, M.C., et al. (2013). Biocompatible nanoparticles and gadolinium complexes for MRI applications. *Comptes Rendus Chimie* 16, 531-539.
- [2] Russo, M., Bevilacqua, P., Netti, P.A. & Torino, E. (2016). A Microfluidic Platform to design crosslinked Hyaluronic Acid Nanoparticles (cHANPs) for enhanced MRI. *Sci. Rep.* 6.
- [3] Ponsiglione, A.M., Russo, M., Netti, P.A. & Torino, E. (2016). Impact of biopolymer matrices on relaxometric properties of contrast agents. *Interface Focus* 6, 20160061.