Multisegmented Ni/Au Nanowires: Electrosynthesis, Characterization, Magnetic Locomotion, and Functionalization

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Micro- and nanotechnologies are currently playing an important role in the development of novel biological nanoscale diagnostic and drug-delivery tools, thanks to significant advances in micro- and nano-structured materials [1]. In this regard, electrodeposition is an efficient technology for micro- and nano-fabrication, especially the template-assisted electrodeposition of metals and alloys. Such a template-assisted electrodeposition route allows a reproducible preparation of nanowires of different sizes and compositions. Currently, with multisegment nanowires based on different materials, electrosynthesis is a focus of great interest as a consequence of their multicomponent architecture that allows the integration of various functions (e.g., locomotion, drug retention, and recognition) that can enhance the efficacy of these biological tools [2].
Here, we propose a facile fabrication pathway for the synthesis of magnetic multisegmented nanowires of Ni and Au (100 nm in diameter and approximately 2 µm in length) to be used as nanocarriers; this combines two different functionalities as a consequence of the two different surfaces (Au and Ni) and, moreover, by means of the action of an external magnetic field, facilitates their movement, directionality, and efficacy. This research consists of creating highly sophisticated multifunctional systems from ecologically friendly formulations for the development of highly biocompatible materials with enhanced efficiency.

References

[1] Bertand, N.; Wu, J.; Xu, X.; Kamaly, N.; Farokhzad, O.C. Advanced Drug Delivery Reviews, 66 (2014) 2-25.
[2] Pereira, A.; Palma, J. L.; Vázquez, M.; Denardinac, J. C.; Escrig, J. Physical Chemistry Chemical Physics, 17 (2015) 5033-5038.

Figure

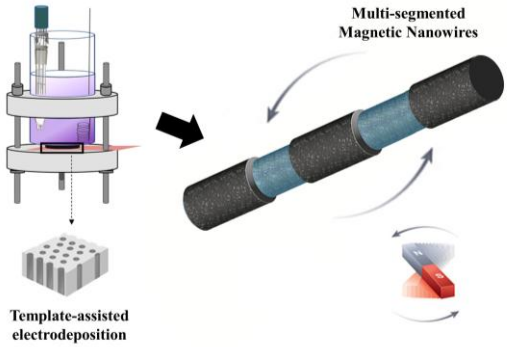

Figure 1: Schematic representation of magnetic multisegmented nanowires of Ni and Au