

Abstract

Synthesis of Iridium and Palladium Nanoclusters for Biomedical Applications [†]

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[†] Presented at the 2nd International Online-Conference on Nanomaterials, 15–30 November 2020;

Available online: <https://iocn2020.sciforum.net/>.

Abstract: Metal nanoclusters (MNCs) have become one of the most promising nanomaterials in the area of analytical chemistry due to their optoelectronic properties and the possibility of bioconjugation to different types of biomolecules (e.g., antibodies). Thus, MNCs can be used as labels for the detection of specific biomolecules in biological samples (e.g., fluids, tissues or cells). MNCs have diameters smaller than 3 nm, so they can be employed to label antibodies without disrupting their recognition capabilities. Another advantage of MNCs compared to other labels is the possibility of performing multimodal detection by using fluorescence, electrochemistry, and mass spectrometry (MS). Such multimodal detection will allow both the characterization of the synthesized MNCs as well as the validation of the analytical methodologies developed for the biomolecules determination. The synthesis of water-soluble luminescent MNCs has been thoroughly investigated in the last decade. The research has been fueled by MNCs properties, such as strong photoluminescence, large Stoke shifts, good photostability and low toxicity. Most of the studies have been devoted to AuNCs and AgNCs, although fluorescent NCs made of copper and platinum have been also reported. In this study, the synthesis of new IrNCs and PdNCs has been tackled. MNCs have been characterized by fluorescence spectroscopy, dynamic light scattering (DLS), high-resolution transmission electron microscopy (HR-TEM) and elemental MS. The synthesized MNCs will be further used as labels for the determination of specific proteins of biomedical interest in fluids (e.g., saliva, nasal exudate and tears) and biological tissues. For such a purpose, an immunoassay will be developed.

Citation: Rodríguez-Penedo, A.; Menero-Valdés, P.; Lores-Padín, A.; Fernández-Abedul, M.T.; Fernández, B.; Pereiro, R. Synthesis of Iridium and Palladium Nanoclusters for Biomedical Applications. *Mater. Proc.* **2021**, *4*, 49. <https://doi.org/10.3390/IOC2020-07976>

Academic Editors: Ana María Díez-Pascual, Antonio Di Bartolomeo and Guanying Chen

Published: 15 November 2020

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Supplementary Materials: The poster presentation is available online at <https://www.mdpi.com/article/10.3390/IOC2020-07976/s1>.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No datasets were generated or analyzed during the current study.