

Ferritin Detection on Inkjet-Printed Gold Nanoporous Electrodes for Anemia

Shanshan Wei (1), Giulio Rosati (1), Gonzalo Hernández (2-3), Cristian Tornador (3), Mayka Sánchez(2), Arben Merkoçi(1)

1. *Institut Català de Nanociència i Nanotecnologia (ICN2), Campus UAB – 08193, Bellaterra (Barcelona), Spain*

2. *Department of Biomedicine, Iron metabolism: Regulation and Diseases Group. Universitat Internacional de Catalunya (UIC). Sant Cugat del Vallès, 08195, Spain*

3. *BloodGenetics S.L. Diagnostics in Inherited Blood Diseases. Esplugues de Llobregat, 08950.*

arben.merkoci@icn2.cat

Iron deficiency anemia is a widespread health issue that needs to be identified accurately and on time. Low serum ferritin levels are a key marker for iron deficiency anemia, helping doctors determine if anemia is due to a lack of iron. The current ferritin quantification methods tend to be invasive and time-consuming. To address this, we propose an immunosensor fabricated by inkjet printing of a gold nanoparticle-based ink and chemically sintered at room temperature by a patented method [1]. Our system utilizes 3-electrodes devices on polyethylene terephthalate (PET) coated substrates, with working (WE) and counter electrode (CE) printed with gold, and the reference electrode (RE) with silver nanoparticles ink. Anti-Ferritin antibodies are immobilized onto the surfaces of the devices by absorption and the devices are blocked with BSA. Ferritin can be quickly and quantitatively detected by measuring amperometric changes in a redox solution by square wave voltammetry (SWV). Finally, the recent development of inkjet-printed conductive microneedles by our research group [2], paves the way to the possibility to obtain antibodies-functionalized wearable devices at a very low cost for real-time measurements in interstitial fluid. This platform would have significant potential to improve diagnostics and patient care by offering a more patient-friendly and efficient alternative to traditional methods.

References

- [1] M. Urban et al. Nanostructure Tuning of Gold Nanoparticles Films via Click Sintering, *Small*, 13(2024) 2306167.
- [2] G. Rosati et al. Introducing all-inkjet-printed microneedles for in-vivo biosensing, SMS 2024 Conference, Barcelona, (accepted for oral presentation).