





## Advantages

Some of the main advantages of the proposed methodology are:

- Possible applicability for the **detection of any miRNA** and other types of RNAs in RNA<sub>t</sub> extracted **from any type of biological sample**
- Simple implementation as **"point-of-care"** diagnostics devices
- **Simple and cost-effective** instrumentation
- Enough sensitivity for direct detection of miRNAs with **no need of additional tedious steps, such as reverse transcription, amplification and/or purification**
- **Multiplexing** capabilities
- **Easy automated** technology
- **Lower assay times and costs in comparison with** conventional methodologies for miRNAs analysis (**qRT-PCR**)
- Provide **reliable quantitative results**
- **Similar efficiency obtained in the analysis of miRNAs in fresh and paraffin embedded tissues (FFPE)**
- Possibility to perform the analysis at **room temperature**

## Where has it been developed

These electrochemical bioplatfroms have been performed in the group of [Electroanalysis and \(Bio\) Electrochemical sensors](#) at the Faculty of Chemistry at the Complutense University of Madrid, headed by Prof. José Manuel Pingarrón in collaboration with the group of Molecular Pharmacology from CIB-CSIC (Dr. José María Sánchez-Puelles) and CANNAN RESEARCH & INVESTMENT S.L company (D. Enrique Sáinz-Martínez).

## And also

The offered methodology has been also successfully applied to the individual and simultaneous detection of two relevant breast cancer miRNAs: miRNA-21 and miRNA-205. These two target miRNAs show opposite roles and expression levels in breast cancer; over-expression or oncogene role for miRNA-21 and down-expression or tumor suppressor role for miRNA-205.

The developed methodologies allow obtaining absolute concentrations of target miRNAs in a simpler, rapid and cost-effective manner in comparison to qRT-PCR, the gold standard method for miRNA detection. In addition, these methodologies avoid the requirements of previous and tedious reverse transcription steps from RNA to DNA, as well as amplification and/or the use of internal standards.

Both the great operation and the high degree of robustness demonstrated by the proposed strategies allow their implementation as powerful analytical tools able to provide additional information to the most frequently clinical test for breast cancer diagnosis, based on semiquantitative assays of protein biomarkers expression levels (immunohistochemistry).

## Responsible Researchers

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