



## Opportunities and challenges of Nanomaterials in analytical science

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## Abstract

As in many other areas, nanoscience and nanotechnology (N&N) have had a deep impact in analytical chemistry. Analytical chemists welcome the challenge and opportunities that N&N offer in this area because of both the powerful nanotools to improve analytical properties of results of analytical processes and analysis of the nano-world. Within the first opportunity, nanomaterials have been mainly used to improve sample treatment and the detection capabilities. On the other hand, the basic (nanoscience) and applied (nanotechnology) developments and achievements need information from the nano-world to fulfil their respective objectives and to make founded and timely decisions. Just in this last way, the determination of nanomaterials (nanoparticles in many cases), in specific types of samples is a recognized challenge in today analytical science. Analytical nanometrology (ANM) merges as the metrology applied to nanomaterials for analytical purposes. In this field nanomaterials are considered as analytes and the analytical goal is the development of analytical strategies for the analysis of specific samples in which they are present. This approach is different than the proper characterization of nanomaterials and it can be seen as full analytical processes, or screening methods for a rapid information about the presence of nanomaterials in particular samples. For this last objective direct spectroscopic and electrochemical techniques can be very useful, whereas for full analytical processes commonly instrumental separation techniques must be involved. In any case, some bottle-necks appear when these methodologies can be used to solve true analytical problems in control laboratories.

## Biography

He is full professor of analytical chemistry in university of castilla – Ia mancha (faculty of chemical science and technology, ciudad real, spain), where he is the leader of the research group on analytical nanoscience and nanotechnolgy. He received his PhD in 1983. His research interests dealt with automation, simplification and miniaturization of chemical measurement processes, particularly the development of chemical sensors integrated in screening analytical systems or miniaturized arrangements incorporating nanomaterials. His recent objective is the development of metrology applied to nanomaterials, including the validation of analytical methods for monitoring nanomaterials in specific samples. He has published more than 350 articles in international journals, author of many books and book chapters, communications in scientific events (some of them by invitation), 5 patents and has directed 25 doctoral thesis. He has been the principal investigator in national and international research projects.



<u>3rd</u> World Congress on Nanomaterials | August 28-29, 2020

Citation: Ángel RÍOS, Opportunities and challenges of Nanomaterials in analytical science, Nanomaterials Congress 2020, 3rd World Congress on Nanomaterials, August 28-29, 2020 | Webinar, 02