

Development and application of porous materials in low-cost supports towards improvement of sample preparation

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Summary

In recent decades, porous materials have gained great attention both industrially and scientifically, presenting different and interesting applications in areas such as gas storage and separation, drug delivery systems, catalysis, among others. Moreover, these materials have received enormous attention in the field of Analytical Chemistry, being applied in the area of sample treatment techniques [1, 2] with the aim of developing sorbents that produce enhanced performance (high extraction efficiency as improved sensitivity and selectivity) analytical methodologies. On the other hand, the development and application of these sorbents must be in line with the principles of Green Analytical Chemistry and sustainability. [3, 4]. In this sense, the commitment to miniaturized strategies that incorporate new materials has promoted the establishment and development of various microextraction techniques that have successfully allowed the separation and pre-concentration of analytes in very complex matrices.

In this talk, different porous materials (polymeric monoliths, metal-organic frameworks, molecularly imprinted polymers, among others) prepared in different low-cost formats/supports (capillaries, micropipette tips, magnets, paper, 3D printed supports, etc.) devoted to be used as sustainable platforms in solid-phase microextraction techniques. Thus, the process of synthesis and characterization of these porous materials will be described, as well as their possible combination with other nanostructured materials (composites) in order to obtain materials with enhanced properties. In addition, some of the most representative analytical applications that use these materials in different low-cost formats will be described. Moreover, the future prospects offered by these materials in the field of sample treatment will be discussed.

References

1. E.V. Soares, Maciel, A.L. de Toffoli, E. Sobieski Neto, C.E. Domingues Nazario, F.M. Lanças, Trends Anal. Chem. 119 (2019) 115633.
2. M.R. Gama, F.R.P. Rocha, C.B.G. Bottoli, Trends Anal. Chem. 115 (2019) 39-51.
3. S. Armenta, S. Garrigues, M. de la Guardia, Trends Anal. Chem. 27 (2008) 497-511.
4. A.I. López-Lorente, F. Pena-Pereira, S. Pedersen-Bjergaard, V.G. Zuin, S.A. Ozkanh, E. Psillakis, Trends Anal. Chem. 148 (2022) 116530.



José Manuel Herrero-Martínez (Sagunto, Spain, 1973), Chemistry Degree (Univ. of Valencia, Spain, 1996) and PhD in Chemistry (Univ. of Valencia, 2000). Assistant Professor (2001-2005) at the Dept. of Analytical Chemistry (Univ. of Barcelona, Spain), post-doctoral researcher (2003-2004) at the Dept. of Chemical Engineering (University of Amsterdam, The Netherlands), Contracted researcher/lecturer (2006-2009) and Associate Professor (2009-2018) and Full Professor (2018-) at the Dept. of Analytical Chemistry (Univ. of Valencia). His

research interests comprise a wide spectrum of analytical techniques and applications including: capillary (electro)separation techniques (1994-), food authentication, control and safety (2004-), surfactant analysis and quality control of cleaning products including evaluation of their environmental impact (1998-), HPLC (1992-), HPLC-MS and CZE-MS (2004-) and development of new stationary phases for separation techniques (2005-) and smart materials for sample treatment (2015-). He has published around 165 research articles in international indexed journals (most of them located in the first quartile), and 5 book chapters (3233 citations, h-index 29, Scopus, 23/11/2021). He has presented more than 270 communications at numerous international and national scientific meetings under different formats. He has participated in regional, national and international R&D projects (16), and he has been in three the principal researcher. Also, he has participated in collaboration agreements (more than 20) with companies belong to different fields (detergency, agri-food area, etc), contributing significantly to the technology transfer. He has supervised 9 Doctoral Thesis with Excellent Cum Laude (two with Doctorate award) and one PhD thesis is currently under execution. Also, he has supervised numerous final degree and master's degree projects (40 and 35, respectively). Concerning assessment activities, he is evaluator of research projects from several research funding agencies such as National Evaluation and Prospective Agency (ANEP), Catalan University Quality Assurance Agency (AQU) and National Agency of Scientific and Technological Promotion (ANPCYT, Argentina). He has collaborated with research groups of several national and foreign universities, and currently collaborates with the University of Balearic Islands, University of Córdoba (Spain), Charles University (Czech Republic) and National University La Plata (Argentina). Also, he has member of the organizing committee of XXI meeting of Spanish Society of Analytical Chemistry (SEQA) 2017 and member of the scientific committee of the international congresses Latin-American symposium on biotechnology, biomedical, biopharmaceutical, and industrial applications of capillary electrophoresis and microchip technology 2019 and Advances in Extraction Techniques 2021. He is a member of the editorial boards of the journals "Molecules" and "Separations". Also, he was guest editor of the "Molecules" journal for the special issues "Analysis of peptides and proteins by electrophoretic techniques" in 2019 and "Advances in molecular recognition materials" in 2020. Also, he is member of the committee of EuChemS-DAC Sample Preparation Study Group and Network. Concerning management responsibilities, he has been Secretary of the Dept. Analytical Chemistry (2011-2014). He has recognized four active six-year research periods ("sexenios") by National Committee for the Assessment of the Research Action (CNEAI) from 1997 to 2020.