Journée d'Electrochimie 2024
1er – 5 Juillet 2024
Saint-Malo, France

Flexible Polymeric Meshes Assembled with 3D Patterned Porous Substrates for Point-of-Care Testing

Victor Diculescu, Daciana Botta, Mihaela Beregoi, Alexandru Evanghelidis, Elena Matei, Ionut Enculescu

National Institute of Materials Physics, Atomistilor 405A, 077125, Magurele, Romania
victor.diculescu@infim.ro

Flexible porous materials have gained a high interest due to their impact on the development of electrochemical point-of-care devices for monitoring the state of health of individuals [1]. Among the porous materials, paper and textiles are most commonly used due to their innate capillary action on fluids. On the other hand, electrospinning allows obtaining polymeric fiber meshes with high efficiency while precise control over process parameters modulate the degree of alignment and densities [2]. Their patterned coating with metals leads to arrays of flexible electrodes. Assembling these electrodes from metal-coated electrospun polymeric fibers with porous materials patterned by 3D printing with hydrophobic barriers that designed fluidic channels and reservoirs led to flexible fluidic electrochemical cells with a large range of applications. The incorporation/immobilization of ionophores for the analysis of electrolytes in sweat [3] and of biomolecules such as oxidase enzymes and DNA oligonucleotides for electrochemical biosensing applications [4,5] are described. Other applications involve fibers coating with thermoresponsive hydrogels or with conductive polymers for development of drug delivery systems [6] and of electrochemical actuators with sensing properties for soft robotics [7].

Acknowledgements: Financial support from the Executive Agency for Higher Education and Research Funding (UEFISCDI) through project PN-III-P4-PCE-2021-1006.

References

(1) Botta, D.; Enculescu, I; Balan, C; Diculescu, V. *Current Opinion in Electrochemistry* **2023**, *42*, 101418.
(2) Leote, R.J.B.; Beregoi, M.; Enculescu, I.; Diculescu, V. *Current Opinion in Electrochemistry* **2022**, *34*, 101024.
(3) Aldea, A.; Matei, E.; Leote, R.J.B.; Rau, I.; Enculescu, I.; Diculescu, V. *Electrochimica Acta* **2020**, *363*, 137239.
(4) Aldea, A.; Leote, R.J.B.; Matei, E.; Evanghelidis, A.; Enculescu, I.; Diculescu, V. *Microchemical Journal* **2021**, *165*, 106108.
(5) Leote, R.J.B.; Crisan, D.; Matei, E.; Enculescu, I. Diculescu, V. *ACS Applied Polymer Materials* **2024**, *6*, 2274.
(6) Evanghelidis, A.; Beregoi, M.; Diculescu, V.C.; Galatanu, A.; Ganea, P.; Enculescu, I. *Scientific Reports* **2018**, *8*, 17555
(7) Beregoi, M.; Evanghelidis, A.; Diculescu, V.C.; Iovu, H.; Enculescu, I. *ACS Applied Materials and Interfaces* **2017**, *9*, 38068-38075