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ABSTRACT:

New Insights into Carbon Fiber Modification for Multifunctional Composites in Energy Storage Applications

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The smart mobility has appeared as an alternative to reduce carbon dioxide emissions by using cleaner, safer and more efficient energy sources. In this scenario, one of the main objectives is electrification of vehicles, where the use of multifunctional supercapacitors and batteries based on composite materials is proposed to fulfill both the energy storage and structural/flexible functionalities, simultaneously [1]. To reach this approach woven carbon fibers, used as electrodes, must be modified to enhance the electrochemical performance by increasing their specific surface are (SSA) [2]. Different modifications of woven carbon fiber (WCF) based on Graphene Nanoplatelets (GNP), Copper Oxide Nanowires over Graphene (CuO@GNP) and Carbonized Lignin (cLIG) has been tested as electrodes on the fabrication and performance of multifunctional supercapacitors. New structural and flexible supercapacitors were fabricated. The manufacturing process was found to be critical, as the fibers or layers must be completely embedded in the solid/gel electrolyte to function effectively. The study to fabricate a structural battery is currently in course.

[1] A. del Bosque, B.K. Muñoz, M. Sánchez, A. Ureña. ACS Appl. Energy Mat. 5, 4247 (2022).
[2] B.K. Muñoz, A. González-Banciella, D. Ureña, M. Sánchez, A. Ureña. Polymers 15, 4036 (2023).