



Synthesis, Functionalization and Applications of Nanocarbons

Simona Bettini ^{1,*} and Gabriele Giancane ^{2,*}

¹ Department of Biological and Environmental Sciences and Technologies, DISTEBA, University of Salento, Via per Arnesano, I-73100 Lecce, Italy

² Department of Cultural Heritage, University of Salento, Via Birago 64, I-73100 Lecce, Italy

* Correspondence: simona.bettini@unisalento.it (S.B.); gabriele.giancane@unisalento.it (G.G.)

The Special Issue “Synthesis, Functionalization and Applications of Nanocarbons” starts from the growing interest of the scientific community in carbon-based materials and the various applications of these versatile compounds. Among the first allotropic forms of carbon that strongly attracted the attention of scientists, there are the fullerenes; then, several works were produced with carbon nanotubes; and, in 2010, studies about graphene earned the Nobel prize for Andre Geim and Konstantin Novoselov. More recently, other carbon-based materials such as nanodiamonds, onion-like carbon nanomaterials, carbon dots, and carbon quantum dots were added to the large and fascinating family of carbon-based nanomaterials.

The Special Issue presents seven contributions focused on carbon-based nanostructures in the form of graphene, carbon dots (CDs), nanodiamonds, onion-like carbon nanomaterials and carbonous doped materials. The applications of nanocarbons include wearable devices, water remediation, energetic applications and the fabrication of sensing devices. The use of carbon nanostructures in wearable devices allowed the fabrication of highly stretchable materials, preserving their electric properties and ensuring high biocompatibility [1]. Co- and N-doped carbon-based nanostructures were synthesized by Gomez-Lopez and co-workers by means of a new and ecofriendly solvent-free process [2]. The obtained materials were proposed as electro-catalysts for energetic and environmental applications.

An environmentally sustainable procedure to obtain graphene oxide starting from graphene was proposed by C. F. Costa and collaborators [3]. An alternative method to obtain onion-like carbon nanostructures starting from detonation nanodiamonds was proposed in [4]: an ethanol-dispersed hydrogenated nanodiamonds suspension was irradiated by means of a green pulsed laser and the chemical–physical features of the obtained nanostructures were critically evaluated by the authors. Li and Zhou studied the effect, in terms of deformations and stress, of localized heating obtained by carbide-bounded graphene on polymeric and vitreous materials [5].

Finally, a research article and a fascinating review concerning a new emerging class of carbon-derived materials, carbon dots, are presented in this Special Issue [6,7]. Several synthetic methods are examined, as well as doping materials used for tuning and for modifying the properties of CDs. Methods of characterizing CDs are reported by Sousa et al., highlighting the most relevant physical and chemical characteristics of carbon dots. In conclusion, examples of the application of CDs in sensing, energy harvesting and conversion, optoelectronics and photocatalysis are reported.

Funding: This research received no external funding.

Acknowledgments: The editors acknowledge all the contributing authors for submitting their valuable research to this Special Issue.

Conflicts of Interest: The authors declare no conflict of interest.



Citation: Bettini, S.; Giancane, G. Synthesis, Functionalization and Applications of Nanocarbons. *Nanomaterials* **2022**, *12*, 2738. <https://doi.org/10.3390/nano12162738>

Received: 1 August 2022

Accepted: 8 August 2022

Published: 10 August 2022

Publisher’s Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

References

1. Claypole, A.; Claypole, J.; Kilduff, L.; Gethin, D.; Claypole, T. Stretchable Carbon and Silver Inks for Wearable Applications. *Nanomaterials* **2021**, *11*, 1200. [[CrossRef](#)] [[PubMed](#)]
2. Gómez-López, P.; Salatti-Dorado, J.A.; Rodríguez-Padrón, D.; Cano, M.; Alvarado-Beltrán, C.G.; Puente-Santiago, A.R.; Giner-Casares, J.J.; Luque, R. Mechanochemically Synthesized PAN-Based Co-N-Doped Carbon Materials as Electrocatalyst for Oxygen Evolution Reaction. *Nanomaterials* **2021**, *11*, 290. [[CrossRef](#)] [[PubMed](#)]
3. Costa, M.C.F.; Marangoni, V.S.; Ng, P.R.; Nguyen, H.T.L.; Carvalho, A.; Castro Neto, A.H. Accelerated Synthesis of Graphene Oxide from Graphene. *Nanomaterials* **2021**, *11*, 551. [[CrossRef](#)] [[PubMed](#)]
4. Bydzovska, I.; Shagieva, E.; Gordeev, I.; Romanyuk, O.; Nemeckova, Z.; Henych, J.; Ondic, L.; Kromka, A.; Stehlik, S. Laser-Induced Modification of Hydrogenated Detonation Nanodiamonds in Ethanol. *Nanomaterials* **2021**, *11*, 2251. [[CrossRef](#)] [[PubMed](#)]
5. Li, L.; Zhou, J. Evaluation of Warpage and Residual Stress of Precision Glass Micro-Optics Heated by Carbide-Bonded Graphene Coating in Hot Embossing Process. *Nanomaterials* **2021**, *11*, 363. [[CrossRef](#)] [[PubMed](#)]
6. Bettini, S.; Ottolini, M.; Pagano, R.; Pal, S.; Licciulli, A.; Valli, L.; Giancane, G. Coffee Grounds-Derived CNPs for Efficient Cr(VI) Water Remediation. *Nanomaterials* **2021**, *11*, 1064. [[CrossRef](#)] [[PubMed](#)]
7. Sousa, H.B.A.; Martins, C.S.M.; Prior, J.A.V. You Don't Learn That in School: An Updated Practical Guide to Carbon Quantum Dots. *Nanomaterials* **2021**, *11*, 611. [[CrossRef](#)] [[PubMed](#)]