

Special Issue: Porous Ceramics, Glasses and Composites, Volume II

Original

Special Issue: Porous Ceramics, Glasses and Composites, Volume II / Baino, Francesco. - In: MATERIALS. - ISSN 1996-1944. - 16:17(2023). [10.3390/ma16175971]

Availability:

This version is available at: 11583/2984040 since: 2023-11-23T14:35:41Z

Publisher:

MDPI

Published

DOI:10.3390/ma16175971

Terms of use:


This article is made available under terms and conditions as specified in the corresponding bibliographic description in the repository

Publisher copyright

(Article begins on next page)

Editorial

Special Issue: Porous Ceramics, Glasses and Composites, Volume II

Francesco Baino 

Institute of Materials Physics and Engineering, Department of Applied Science and Technology, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 Turin, Italy; francesco.baino@polito.it

This Special Issue, titled “Porous Ceramics, Glasses and Composites, Volume II”, aims to present an up-to-date overview of the synthesis/fabrication, characterization, and applications of porous materials, with a special focus on ceramics, glasses, and composites.

There are many examples of natural ceramic-based porous materials that are widely researched and investigated, such as cancellous bone in mammals, which is actually a composite mainly made of hydroxyapatite and collagen that are exquisitely interlocked to form a three-dimensional trabecular architecture [1]. Synthetic porous materials are sometimes designed and fabricated following a bioinspired approach in order to optimize the performance of the product/device [2]. In recent years, the importance of porous materials has significantly grown because of their versatile industrial, high-tech, and popular applications, covering multiple fields from energy exploitation to biomedicine. Nowadays, porous ceramics are used to fabricate a huge variety of devices, such as hot gas or dust collectors, absorbers, thermal insulators, dielectric resonators, engine components for the automotive industry, biomaterials, drug delivery systems, phase separation and filtration devices, etc. The wide use of these materials relies on their appealing properties, such as chemical, biological, and thermal stability/resistance, refractoriness, low thermal conductivity, and relatively low density. If exhibiting open and interconnected pores, porous ceramics allow liquid and gases to flow in and out and, thus, their mass transport properties become of utmost importance [3]. In this regard, permeability confers to these materials the ability to filter, deliver, and release different fluids, substances, and particles. In the fabrication of porous ceramic materials, a key factor is represented by the control of pore characteristics (e.g., amount, size, geometry, interconnectivity, etc.) that can be tailored by properly setting the parameters in several processing methods. Furthermore, the evolution of additive manufacturing technologies and the progressive spreading of these methods, even in industrial contexts at an affordable cost, has opened new horizons in terms of the improved performance of the products, higher control on shape/dimensions, reliability, and ease of scalability [4,5]. An important role is also played by the features of raw materials, type of binder used, and sintering parameters, which can all affect the final porosity in terms of pore volume and pore size distribution.

The research topics covered by this Special include, but are not limited to, the following applications: thermal and acoustic insulation; construction; filtration/separation; catalysis; biomedical field; diffusion in porous media. The use of porous materials in the circular economy, the development of hierarchical porous systems, as well as studies on the modeling of the properties and processes are highly appealing topics. Research papers concerning the structure–property–function relationships in porous ceramics, glasses, and composites are also key to this Special Issue.

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



Citation: Baino, F. Special Issue: Porous Ceramics, Glasses and Composites, Volume II. *Materials* **2023**, *16*, 5971. <https://doi.org/10.3390/ma16175971>

Received: 26 August 2023

Accepted: 30 August 2023

Published: 31 August 2023



Copyright: © 2023 by the author. 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. Reznikov, R.; Shahar, R.; Weiner, S. Bone hierarchical structure in three dimensions. *Acta Biomater.* **2014**, *10*, 3815–3826. [[CrossRef](#)] [[PubMed](#)]
2. Baino, F.; Ferraris, M. Learning from Nature: Using bioinspired approaches and natural materials to make porous bioceramics. *Int. J. Appl. Ceram. Technol.* **2017**, *14*, 507–520. [[CrossRef](#)]
3. Wadsworth, F.B.; Vasseur, J.; Heap, M.J.; Carbillet, L.; Dingwell, D.B.; Reuschlé, T.; Baud, P. Universal model for the permeability of sintered materials. *Acta Mater.* **2023**, *250*, 118859. [[CrossRef](#)]
4. Baino, F.; Fiume, E. 3D printing of hierarchical scaffolds based on mesoporous bioactive glasses (MBGs)-fundamentals and applications. *Materials* **2020**, *13*, 1688. [[CrossRef](#)] [[PubMed](#)]
5. Lamnini, S.; Elsayed, H.; Lakhdar, Y.; Baino, F.; Smeacetto, F.; Bernardo, E. Robocasting of advanced ceramics: Ink optimization and protocol to predict the printing parameters—A review. *Heliyon* **2022**, *8*, e10651. [[CrossRef](#)] [[PubMed](#)]

Short Biography of Author

Francesco Baino is an Associate Professor of Materials Science and Technology in the Department of Applied Science and Technology, Politecnico di Torino, Italy. He graduated in Biomedical Engineering (summa cum laude) in 2006 and received his Ph.D. in Materials Science and Technology in 2010 from Politecnico di Torino. His current research interests mainly include: biomaterials and tissue engineering with special focus on bioceramics and bioactive glasses; porous ceramics; sustainable materials; processing and testing of advanced ceramics. He is member of the American Ceramic Society. Prof. Baino is Section Editor-in-Chief of Materials (MDPI) for the section “Advanced and Functional Ceramics and Glasses”, as well as Associate Editor of the International Journal of Applied Ceramic Technology (Wiley) and Frontiers in Bioengineering and Biotechnology (Frontiers Group). Prof. Baino has published more than 250 peer-reviewed journal articles and book chapters with an H-index of 50 (>8000 citations), and is author of 3 patents. According to a scientometric study published in PLOS Biology in 2021 and updated in the subsequent years, Prof. Baino is among the 2% top-cited scientists in the world.

Disclaimer/Publisher’s Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.