

Special Issue on Selected Papers in the Section Materials 2022

Roberto Zivieri ^{1,2} ¹ Istituto Nazionale di Alta Matematica (INdAM), 00185 Rome, Italy; roberto.zivieri@unife.it² Consorzio Futuro in Ricerca (CFR), 44122 Ferrara, Italy

The study of materials has entailed several efforts by materials scientists to gain a deep understanding of their structural, mechanical, chemical, optical, magnetic and electronic properties and engineering applications.

This Special Issue collects selected papers in the Section Materials 2022 that had an important impact on the materials community, including modeling and simulations, measurements and data analysis to reproduce materials' properties.

A total of nineteen papers (sixteen original research articles, two review articles and one perspective article) presented recent results on different types of materials by means of theoretical analyses, numerical simulations and measurements, by suggesting technological applications and by covering the subjects of materials science, engineering, chemistry, chemical physics, physics and biological physics.

Yi et al. [1] measured the material degradation master curves, shift functions and glass transition temperatures of four polymers used for different types of 3D printing techniques. Smarzewski carried out mechanical and microstructural tests of high-performance concretes possessing different levels of condensed silica fume used as replacements for cement [2] and evaluated the influence of polypropylene fibers on high-performance self-compacting concrete [3]. Dal Poggetto et al. [4] experimentally investigated the transformation of cork powdery waste into a geopolymer mix for a novel composite to be employed in insulating panels. Acquesta et al. [5] observed that the corrosion resistance of two commercial products based on hexafluorotitanate and dihydrogen hexafluorozirconate, the first containing CrIII and the second being free of Cr, is comparable, showing good protective properties and a low environmental impact. Chen et al. [6] showed that, by combining vacuum and mechanical compression, low-density polyethylene foams can be converted into auxetic metamaterials characterized by negative tensile and compressive Poisson ratios. By means of dynamic shear rheology, atomic force microscopy and light microscopy, Abe et al. [7] explored how the addition of recycling agents affects virgin, aged and recycled bitumen. Osička et al. [8] measured the cutting force during the machining of hardened steel with cubic boron nitride tools. By means of the finite element code ABAQUS/Explicit, Walkowiak et al. [9] presented a numerical study of the structural behavior of prismatic and lattice core topologies in sandwich-structured composites subjected to air-blast impact. Danfá et al. [10] experimentally showed that powder TiO₂ impregnated in a ceramic material can improve liquid wastewater treatment via the photocatalysis process. Saccani et al. [11] experimentally observed that the recycled fibers dispersed in both pure polybutylene terephthalate and its blend improve their mechanical properties. Norambuena-Conteras [12] et al. proposed the synthesis and characterization of biopolymeric capsules for asphalt self-healing, showing that waste cooking oil capsules can be mixed in asphalt mixtures. Hart et al. [13] carried out numerical calculations and simulations for designing diterpene-peptide and polyphenol-peptide conjugates to target multiple over-expressed receptors in tumor cells. Prado et al. [14] carried out an experimental procedure using a commercial transient hot-wire device to measure the thermal conductivity of nanofluids. De Almeida et al. [15] devised a novel strategy employed in plastic injection molds to develop a novel hybrid and hydraulic movement. Lee et al. [16] used a long-wavelength terahertz optical probe



Citation: Zivieri, R. Special Issue on Selected Papers in the Section Materials 2022. *Appl. Sci.* **2023**, *13*, 6527. <https://doi.org/10.3390/app13116527>

Received: 9 May 2023

Accepted: 25 May 2023

Published: 26 May 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/>).

to determine the structural properties of magnetic thin films in the ultrafast time scale. Kania et al. [17] reviewed the state of the art of primary and secondary zinc production and demand. Leonello et al. [18] reviewed recent strategies based on the use of photocatalysts to limit the contamination effects of PFAS substances. Pawlus et al. [19] offered a perspective on coordination materials as new energetic materials.

Although this Special Issue has been closed, several efforts are still being put together on the topics, and the authors are facing new challenges to advance their previous results.

Acknowledgments: I would like to express my gratitude to all the staff and people involved in this Special Issue.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Yi, S.; Oh, N.; Min, K.-E.; Shin, J.-S.; Kim, C. Thermo-Viscoelastic Characterization of 3D Printing Polymers. *Appl. Sci.* **2023**, *13*, 2876. [[CrossRef](#)]
2. Smarzewski, P. Mechanical and Microstructural Studies of High Performance Concrete with Condensed Silica Fume. *Appl. Sci.* **2023**, *13*, 2510. [[CrossRef](#)]
3. Smarzewski, P. Fresh and Mechanical Properties of High-Performance Self-Compacting Concrete Containing Ground Granulated Blast Furnace Slag and Polypropylene Fibres. *Appl. Sci.* **2023**, *13*, 1975. [[CrossRef](#)]
4. Dal Poggetto, G.; Marchetti, R.; Lancellotti, I.; Leonelli, C.; Barbieri, L. Waste Cork in Metakaolin–Geopolymer Matrix: Physico-Mechanical Characterization. *Appl. Sci.* **2023**, *13*, 1804. [[CrossRef](#)]
5. Acquesta, A.; Sinagra, C.; Monetta, T. Electrochemical and Economic Analysis of No-Rinse, “True-Cr-Free” Surface Conversion Coatings for a Green, Cost-Saving, Corrosion Protection of 8079 Aluminium Alloy. *Appl. Sci.* **2023**, *13*, 1560. [[CrossRef](#)]
6. Chen, X.Y.; Underhill, R.S.; Rodrigue, D. A Simple Method to Convert Cellular Polymers into Auxetic Metamaterials. *Appl. Sci.* **2023**, *13*, 1148. [[CrossRef](#)]
7. Abe, A.A.; Caputo, P.; Eskandarsefat, S.; Loise, V.; Porto, M.; Giorno, E.; Venturini, L.; Rossi, C.O. Rejuvenating Agents vs. Fluxing Agents: Their Respective Mechanisms of Action on Bitumen Subjected to Multiple Aging Cycles. *Appl. Sci.* **2023**, *13*, 698. [[CrossRef](#)]
8. Osička, K.; Zouhar, J.; Sliwková, P.; Chladil, J. Cutting Force When Machining Hardened Steel and the Surface Roughness Achieved. *Appl. Sci.* **2022**, *12*, 11526. [[CrossRef](#)]
9. Walkowiak, M.; Reinicke, U.; Anders, D. Numerical Investigation of Different Core Topologies in Sandwich-Structured Composites Subjected to Air-Blast Impact. *Appl. Sci.* **2022**, *12*, 9012. [[CrossRef](#)]
10. Danfá, S.; Oliveira, C.; Santos, R.; Martins, R.C.; Quina, M.M.J.; Gomes, J. Development of TiO₂-Based Photocatalyst Supported on Ceramic Materials for Oxidation of Organic Pollutants in Liquid Phase. *Appl. Sci.* **2022**, *12*, 7941. [[CrossRef](#)]
11. Saccani, A.; Fiorini, M.; Manzi, S. Recycling of Wastes Deriving from the Production of Epoxy-Carbon Fiber Composites in the Production of Polymer Composites. *Appl. Sci.* **2022**, *12*, 4287. [[CrossRef](#)]
12. Norambuena-Contreras, J.; Concha, J.L.; Arteaga-Pérez, L.E.; Gonzalez-Torre, I. Synthesis and Characterisation of Alginate-Based Capsules Containing Waste Cooking Oil for Asphalt Self-Healing. *Appl. Sci.* **2022**, *12*, 2739. [[CrossRef](#)]
13. Hart, L.R.; Lebedenko, C.G.; Mitchell, S.M.; Daso, R.E.; Banerjee, I.A. In Silico Studies of Tumor Targeted Peptide-Conjugated Natural Products for Targeting Over-Expressed Receptors in Breast Cancer Cells Using Molecular Docking, Molecular Dynamics and MMGBSA Calculations. *Appl. Sci.* **2022**, *12*, 515. [[CrossRef](#)]
14. Prado, J.I.; Calviño, U.; Lugo, L. Experimental Methodology to Determine Thermal Conductivity of Nanofluids by Using a Commercial Transient Hot-Wire Device. *Appl. Sci.* **2022**, *12*, 329. [[CrossRef](#)]
15. De Almeida, F.; Sousa, V.F.C.; Silva, F.J.G.; Campilho, R.D.S.G.; Ferreira, L.P. Development of a Novel Design Strategy for Moving Mechanisms Used in Multi-Material Plastic Injection Molds. *Appl. Sci.* **2021**, *11*, 11805. [[CrossRef](#)]
16. Lee, H.; Weber, C.; Fahnle, M.; Shalaby, M. Ultrafast Electron Dynamics in Magnetic Thin Films. *Appl. Sci.* **2021**, *11*, 9753. [[CrossRef](#)]
17. Kania, H.; Saternus, M. Evaluation and Current State of Primary and Secondary Zinc Production—A Review. *Appl. Sci.* **2023**, *13*, 2003. [[CrossRef](#)]
18. Leonello, D.; Fendrich, M.A.; Parrino, F.; Patel, N.; Orlandi, M.; Miotello, A. Light-Induced Advanced Oxidation Processes as PFAS Remediation Methods: A Review. *Appl. Sci.* **2021**, *11*, 8458. [[CrossRef](#)]
19. Pawlus, K.; Jarosz, T.; Stolarczyk, A. Coordination Energetic Materials—Scientific Curiosity or Future of Energetic Material Applications? *Appl. Sci.* **2022**, *12*, 10498. [[CrossRef](#)]

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.