



Editorial: Biopolymer-Based Hydrogels – Ubiquitous and Prospective Materials

Miloslav Pekař*

Faculty of Chemistry, Brno University of Technology, Brno, Czechia

Keywords: editorial, biopolymer, biomaterial, cross-linked material, hydrogels 1

Editorial on the Research Topic

Biopolymer-Based Hydrogels – Ubiquitous and Prospective Materials

Although hydrogels have been of both scientific and technical interest for a very long time, research into these compounds is very far from complete. Indeed, we can witness widespread research efforts to upgrade hydrogels into ever more sophisticated materials, with synthetic and physical chemists striving to make hydrogel structures and properties ever more complex and more ingenious (De France et al., 2018; Raghuvanshi and Garnier, 2019). Modern researchers are trying to make hydrogels more and more similar to materials found in biological bodies, with the aim of enabling such hydrogels to effectively mimic their bio-counterparts and thereby become available for increasingly advanced use in medicine (Du et al., 2015; Gharazi et al., 2018; Klotz et al., 2018; Li et al., 2018; Rosenberg et al., 2019; Xie et al., 2019). However, hydrogel applications are not limited to their traditional areas – the food and pharma industries – as they find use either directly as materials with specific properties or indirectly as templates for other products [see, for example, Zhou et al. (2019)].

The articles covering this research topic represent only a small window on contemporary research and development in the field of hydrogels. They are short pieces illustrating the whole mosaic with a special focus on bio-based materials, and report, for example, on progress in the development of self-healing hydrogels or bio-inks designed for the 3D printing of hydrogels for application in tissue engineering, as well as on experience with cell differentiation in relation to hydrogel stiffness and the potential application of hydrogels in the treatment of aneurysms.

OPEN ACCESS

Edited by:

Dayang Wang,
RMIT University, Australia

*Correspondence:

Miloslav Pekař
pekar@fch.vut.cz

Specialty section:

This article was submitted to Colloidal,
Materials, and Interfaces,
a section of the journal
Frontiers in Materials

Received: 23 July 2020

Accepted: 24 August 2020

Published: 14 September 2020

Citation:

Pekař M (2020) Editorial: Biopolymer-
Based Hydrogels – Ubiquitous and
Prospective Materials.
Front. Mater. 7:586526.
doi: 10.3389/fmats.2020.586526

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

REFERENCES

- De France, K. J., Xu, F., and Hoare, T. (2018). Structured macroporous hydrogels: progress, challenges, and opportunities. *Adv. Healthcare Mater.* 7, 1700927. doi:10.1002/adhm.201700927
- Du, X., Zhou, J., Shi, J., and Xu, B. (2015). Supramolecular hydrogelators and hydrogels: from soft matter to molecular biomaterials. *Chem. Rev.* 115, 13165–13307. doi:10.1021/acs.chemrev.5b00299
- Gharazi, S., Zarket, B. C., DeMella, K. C., and Raghavan, S. R. (2018). Nature-inspired hydrogels with soft and stiff zones that exhibit a 100-fold difference in elastic modulus. *ACS Appl. Mater. Interfaces* 10, 34664–34673. doi:10.1021/acsami.8b14126
- Li, Q., Ning, Z., Ren, J., Liao, W., Vallmajo-Martin, Q., Clevers, H., et al. (2018). Structural design and physicochemical foundations of hydrogels for biomedical applications. *Curr. Med. Chem.* 25, 963–981. doi:10.2174/0929867324666170818111630

- Raghuwanshi, V. S., and Garnier, G. (2019). Characterisation of hydrogels: Linking the nano to the microscale. *Adv. Colloid Interface Sci.* 274, 102044. doi:10.1016/j.cis.2019.102044
- Klotz, B. J., Oosterhoff, J., Utomo, L., Lim, K. S., Vallmajo-Martin, Q., Clevers, H. et al. (2019). Versatile biosynthetic hydrogel platform for engineering of tissue analogues. *Adv. Healthc. Mater.* 8, e1900979. doi:10.1002/adhm.201900979
- Xie, R., Zheng, W., Guan, L., Ai, Y., and Liang, Q. (2019). Engineering of hydrogel materials with perfusable microchannels for building vascularized tissues. *Small* 16, 1902838. doi:10.1002/sml.201902838
- Zhou, X., Guo, Y., Zhao, F., and Yu, G. (2019). Hydrogels as an emerging material platform for solar water purification. *Acc. Chem. Res.* 52, 3244–3253. doi:10.1021/acs.accounts.9b00455

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2020 Pekař. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.