

# Harnessing lipidic mesophases to treat inflammation in Ulcerative Colitis

*Simone Aleandri*

*Department of Chemistry, Biochemistry and Pharmaceutical Sciences, University of Bern, Switzerland*

*simone.aleandri@unibe.ch*

The side effects associated with a systemic administration of therapeutics must be thus weighed against potential benefits in patient management whereas the specific localization of some diseases, such as ulcerative colitis (UC; a chronic inflammatory bowel disease that strongly affects patient quality of life) encourages us to propose the utilization of lipid mesophase (LMP) gel for the local delivery of high concentration of actives. Thanks to the unique materials' properties of these lipidic self-assembled structures, such as their ability to entrap molecules of various polarities and sizes and their bioadhesivity, an exquisite spatial, temporal, and dosage control of drugs upon local administration can be achieved<sup>1</sup>.

Capitalizing on the biocompatible and biodegradable structure of LMPs we developed a temperature-triggered in situ forming lipid gel (TIF-Gel) for topical treatment of UC [2]. TIF-Gel is versatile and can host and release drugs of different polarities, e.g., tofacitinib and tacrolimus, in a sustained manner. Further, it adheres to the colonic wall for at least 6 hours, thus preventing leakage and improving drug bioavailability. Importantly, loading known UC treatment drugs into TIF-gel improved animal health in two mouse models of acute colitis. Overall, our TIF-Gel may prove beneficial in ameliorating colitis and decreasing adverse effects associated with systemic application of immunosuppressive treatments.

## References

- [1] S. Aleandri, R. Mezzenga, *Phys. Today*, **2020**, 73, 38–44.
- [2] M. Carone, M.S. Spalinger, R.A. Gaultney, R. Mezzenga, A. Mookhoek, P. Krebs, G. Rogler, P. Luciani, S. Aleandri. Temperature-triggered in situ forming gel for local treatment of ulcerative colitis. *Nature Commun.* (2023) In press. Pre-print available at bioRxiv <https://doi.org/10.1101/2022.09.28.509483>