# Towards colour-changing bio-degradable materials

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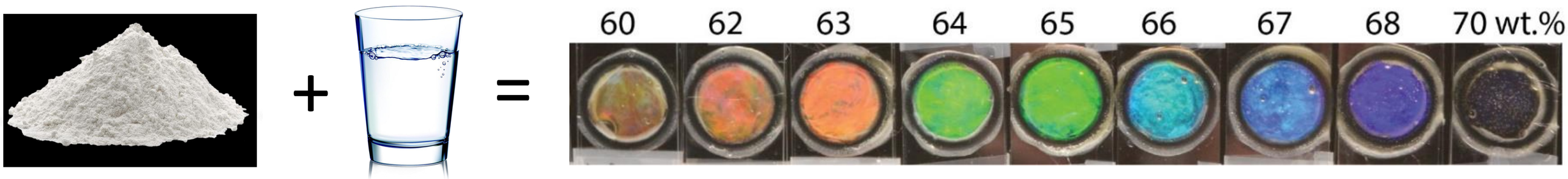
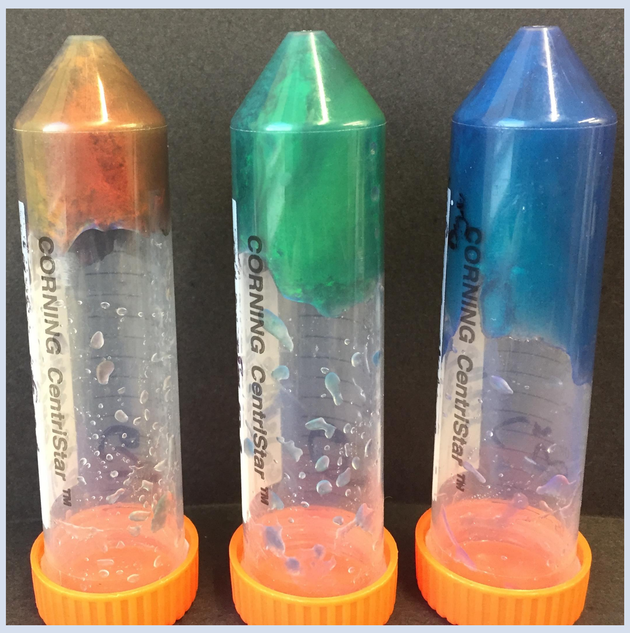
**Biodegradable** hydroxypropyl cellulose (HPC) is a cheap and edible white powder, that when dissolved, forms an attractive liquid crystal with distinct red, green or blue colouration.[1] By applying a pressure, the materials colour can be changed at will, termed mechanochromism.[2] The aim is to capture this colour changing property into the solid state and quantify its behaviour at varying length scales.



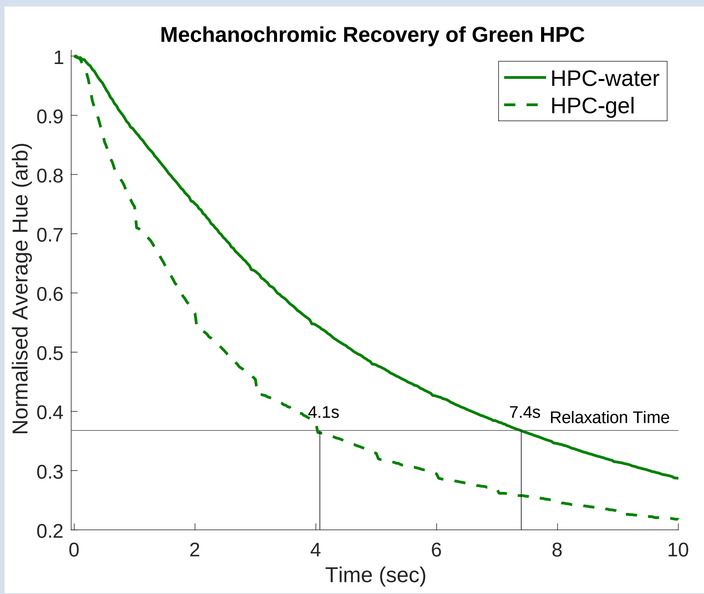

## Gelling HPC and keeping mechanochromism



Gelled it

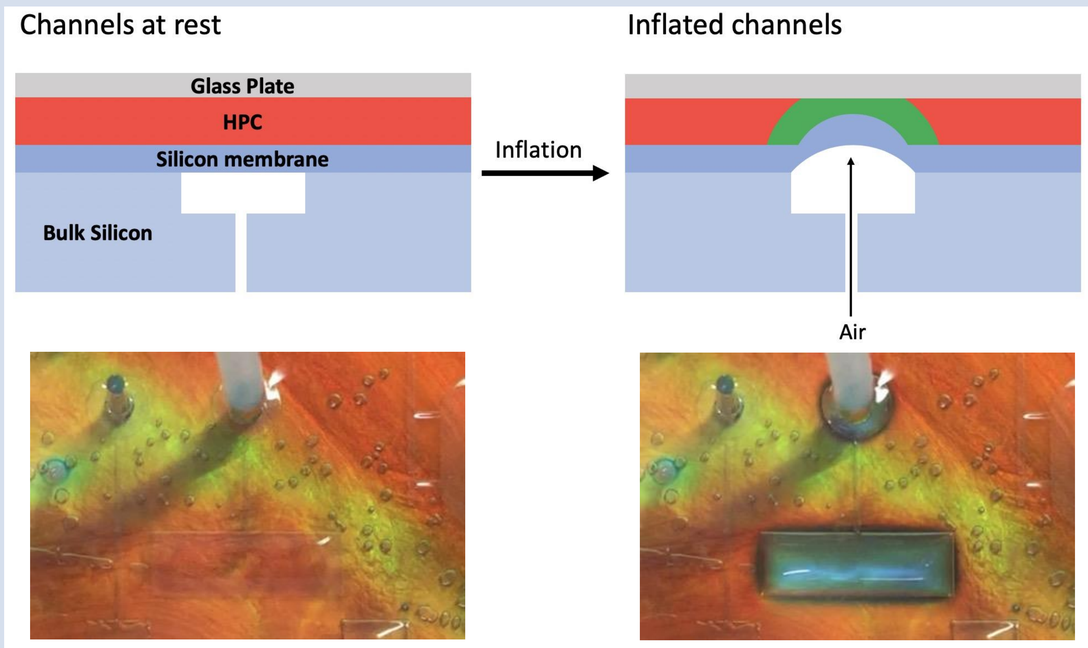
Kept it's colour

Improved colour recovery




## Probing mechanochromism at the smallest scales

Flexible microcavities can be designed so that pumping in air inflates them like a balloon. The HPC above is compressed and a colour change observed. By designing these microcavities at varying length scales, HPCs mechanochromism can be tested under different conditions and in a repeatable manner.




## Conclusion

HPC mechanochromism can be captured into the solid state, with edibility and a scalable production process retained. Microcavities at varying length scales allow quantification of the mechanochromic response. Applications include biodegradable pressure sensors, food packaging 'smart label' or as a novel food cosmetic.

## Disclaimer

These results are not yet published. Sensitive information has been purposefully excluded. For more information, please ask the speaker. *chb50*

## References

[1] R. S. Werbowyj, D. G. Gray, *Molecular Crystals and Liquid Crystals* **1976**, 34, p97.

[2] G. Kamita, B. Frka-Petesic, A. Allard, M. Dargaud, K. King, A. G. Dumanli, S. Vignolini, *Advanced Optical Materials* **2016**, 4, p1950.

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