



Poly(ionic liquid) Based Thermo-Responsive Hydrogels

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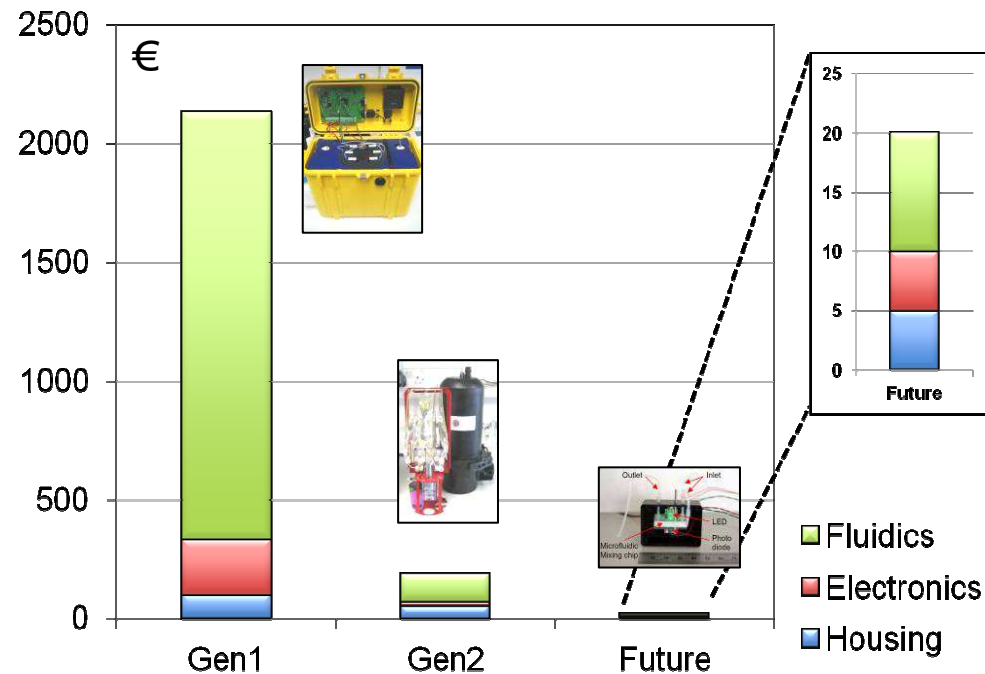
ATWARM

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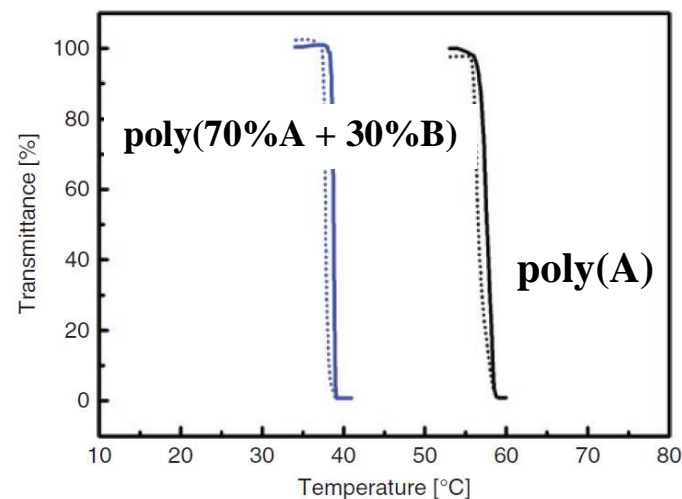
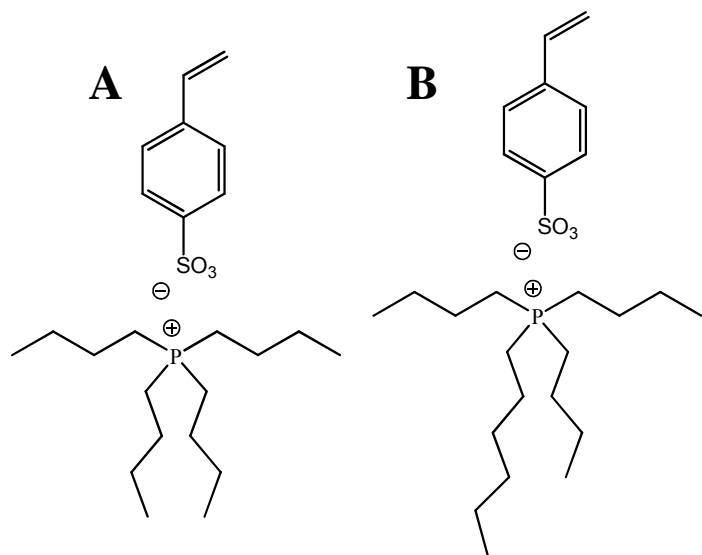
The need for stimuli-responsive materials for microfluidic sensor platforms

- Autonomous sensor platforms for water quality are available
- High cost, high maintenance, high power usage
- Evolutionary engineering approach
- Revolutionary materials research

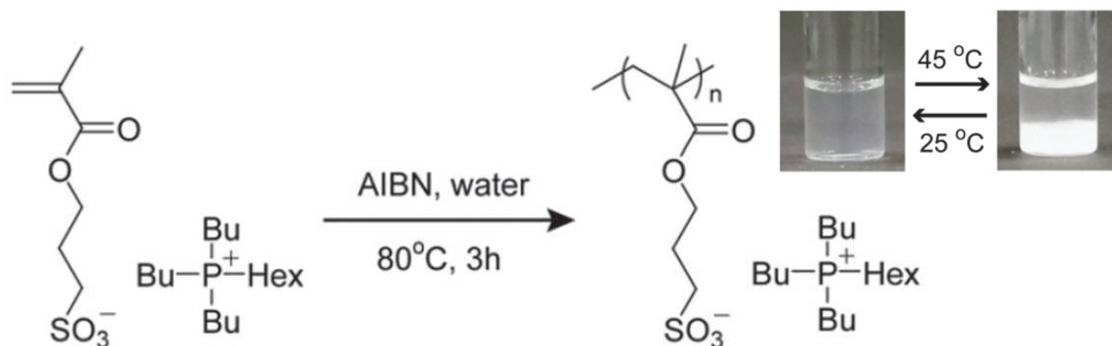


Thermo-responsive poly(ILs)

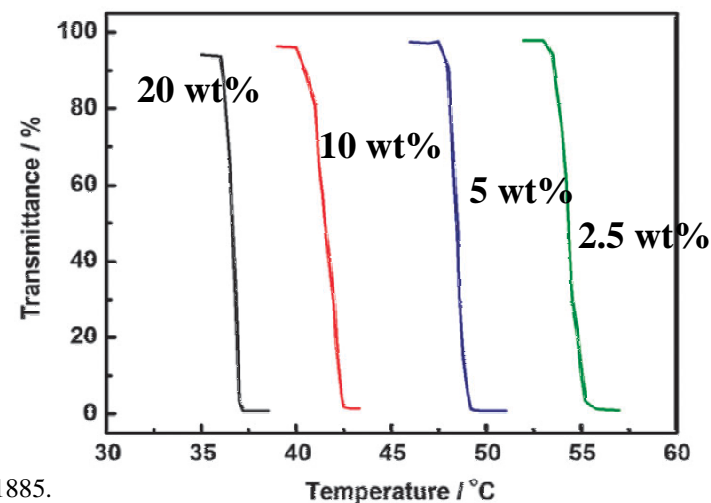
New polymeric ionic liquids that are thermo-responsive have been recently reported



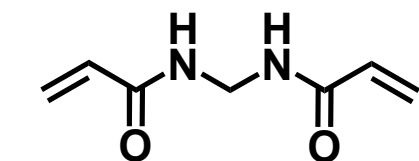
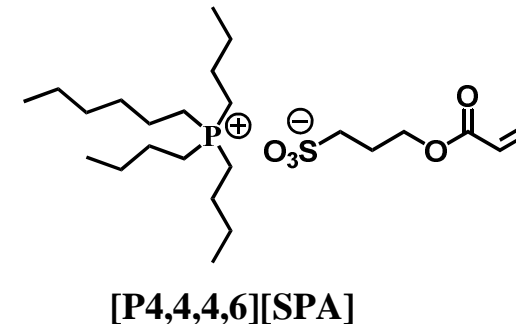
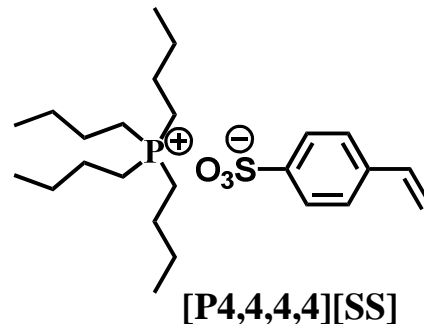
Y. Kohno and H. Ohno,
Aust. J. Chem., 2011,
65, 91-94



Y. Kohno, Y. Deguchi and H. Ohno, *Chem. Commun.*, 2012, 48, 11883-11885.



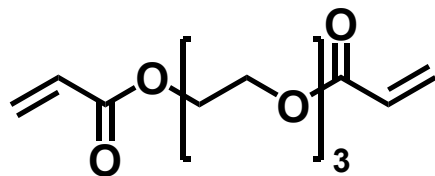
Preparation of thermo-responsive poly(IL) gels



MBIS

Cracks,
no stable shape,
excessive swelling

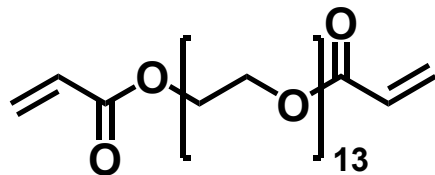
Cracks,
no stable shape,
excessive swelling



PEG 256
diacrylate

Cracks,
no stable shape

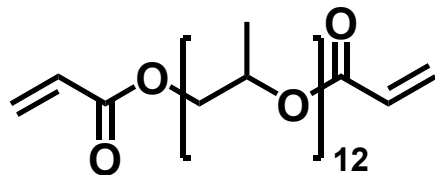
Cracks,
no stable shape



PEG 700
diacrylate

Stable, transparent gel

Stable, transparent gel



PPO 800
diacrylate

Stable, transparent gel
(up to 9 %mol)

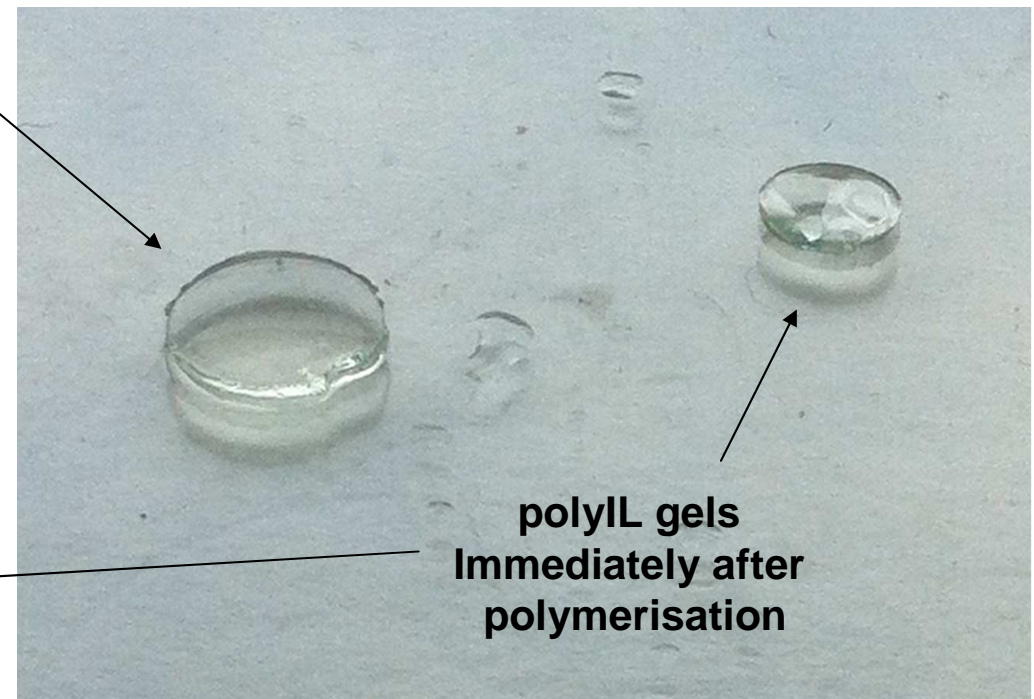
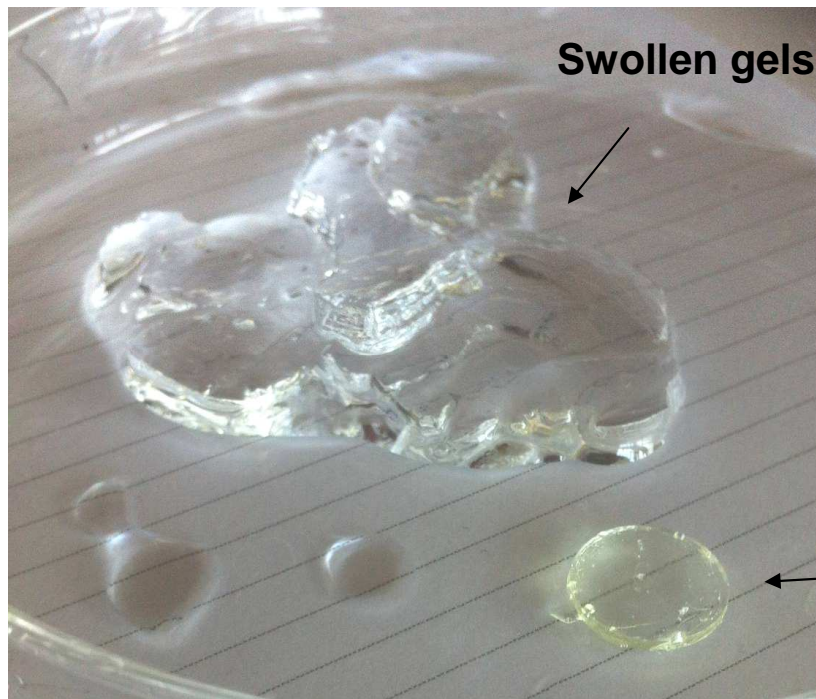
Stable, transparent gel
(up to 9 %mol)



Preparation of thermo-responsive poly(IL) gels

$[P_{4,4,4,4}][SS] + 10\% \text{ MBIS}$

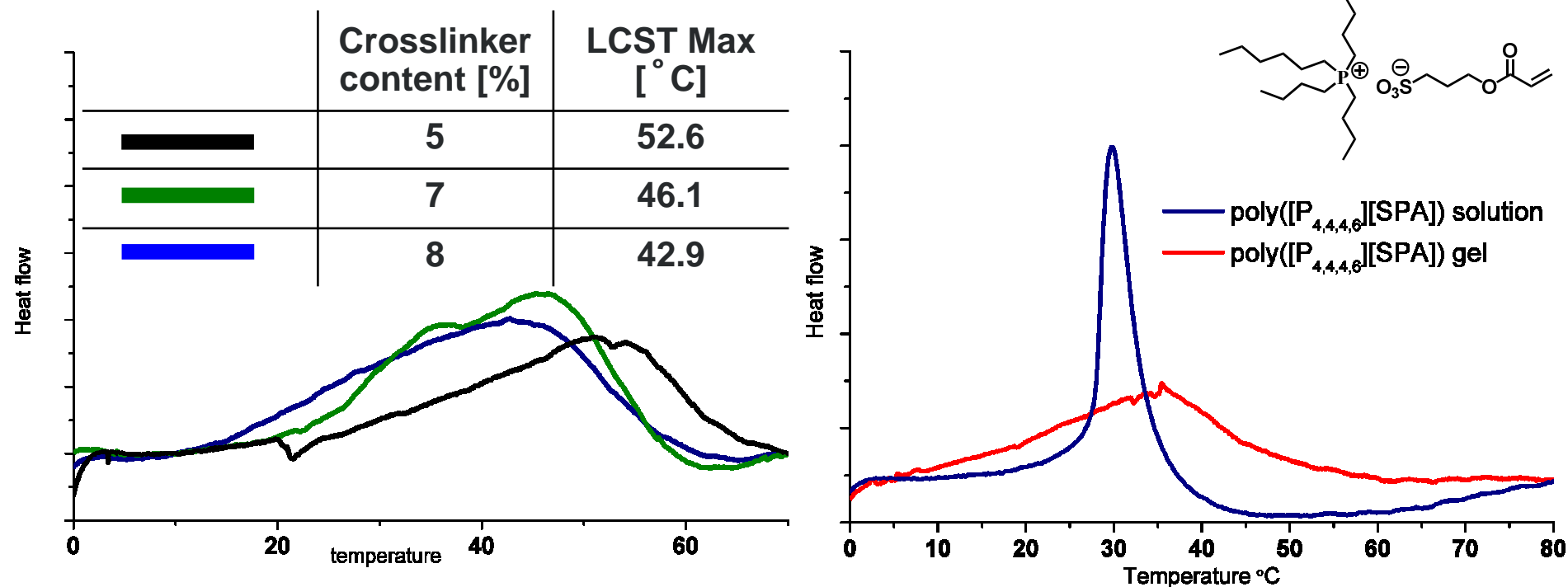
$[P_{4,4,4,6}][SPA] + 5\% \text{ PPO800 diacrylate}$



Only longer chain crosslinkers allow mechanically stable hydrogels



Thermal analysis of poly(IL) gels (DSC)



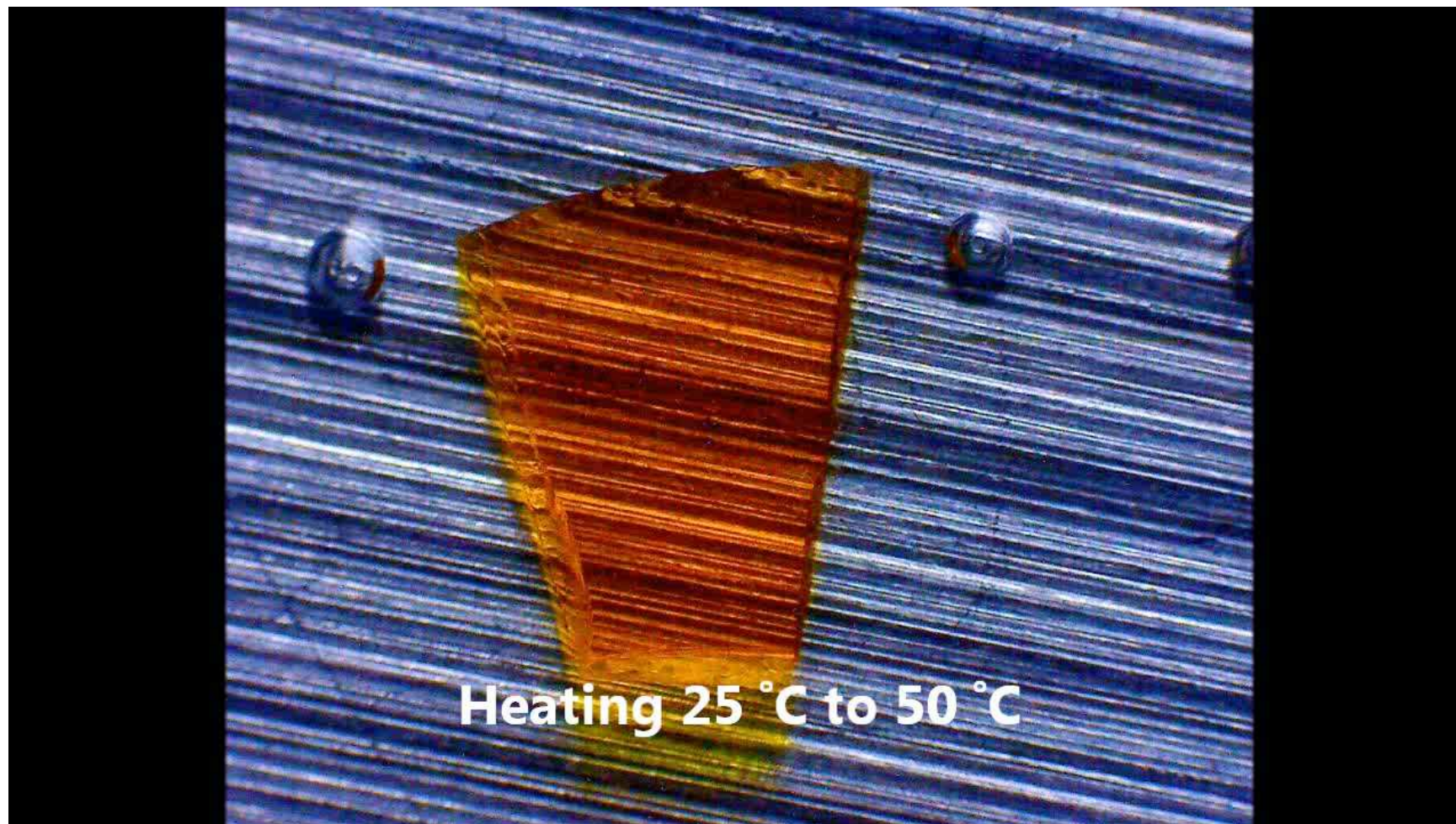
Crosslinker amount allows LCST tuning

Crosslinking significantly broadens the LCST peak

Manuscript submitted



Thermal behaviour of poly(IL) gel



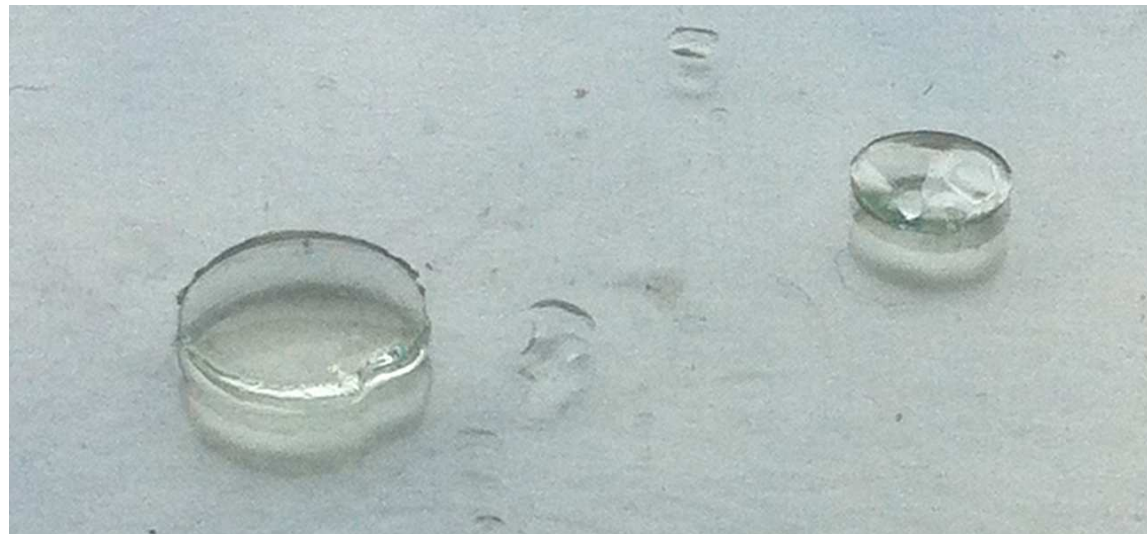
1 mm

Speed 64x



Conclusions

- ▶ Hydrogels from monomeric LCST phosphonium-based ILs can be produced
- ▶ Only using longer chain crosslinkers results in mechanically stable gels
- ▶ Crosslinker amount controls the LCST
- ▶ Crosslinking significantly broadens the IL's LCST peak



Acknowledgements

Prof. Dermot Diamond

All colleagues from CLARITY/NCSR

- FP7 ATWARM grant (Marie Curie ITN, No. 238273).

Please visit:

Poster P37

Poster P42

Poster P332

Poster P399

