# Smart coatings in the pipeline: Made from cheap chemicals, this polymer packs a punch

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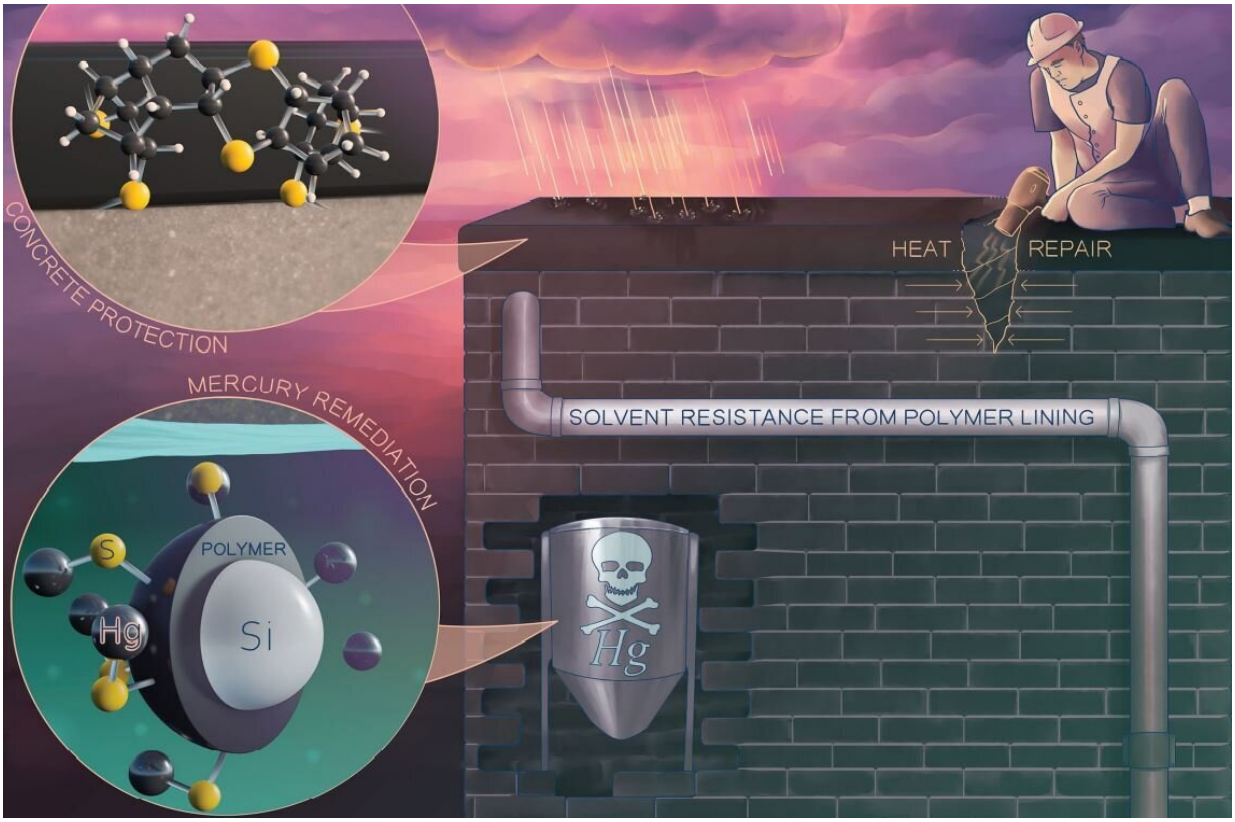


Cover artwork from *Polymer Chemistry* (March 2022). Credit: Flinders University

An imaginative approach to polymer surface coating has produced a sustainable way to remove mercury from water—while providing a wide

range of protection including for preventing metal corrosion and solvent damage of plastic PVC pipes.

The smart coating, made from low-cost chemicals from oil refining and other sources, also can prevent acid and water damage of concrete surfaces and be repaired in situ by a simple heating process, says Flinders University project leader Max Mann.

"Made easily from elemental sulfur and dicyclopentadiene (DCPD is a by-product of petroleum refining), this new coating is multi-functional which gives us wide scope to use it in a wide range of useful ways and for longer lasting industrial products and components," says Flinders University Ph.D. candidate Mr Mann, lead author of the cover article in this month's issue of *Polymer Chemistry*.

"This exciting new area of research extends fundamental chemistry to several practical applications."

"The method for making the coating is safer than methods previously used for related coatings. The team developed a lower temperature process that prevented runaway reactions," adds co-author University of Liverpool researcher Dr. Bowen Zhang.

Along with its protective powers against corrosion, solvent damage and acid and water damage, the research found the active coating can capture toxic metals such as mercury.

The coating is repairable and scratches and damage can be prepared by the simple application of heat, the Flinders-Liverpool team found.

This process is possible because of the coating's chemical structure which allows sulfur-sulfur bonds to be broken and re-formed.

Flinders University chemistry Professor Justin Chalker says the research is a significant step forward in multi-functional coatings.

"The unique chemical composition of the smart coating enables protection of substrates, active removal of toxic mercury species from water and oil, and is repairable which ensures its sustainability," says Matthew Flinders Professor Chalker, from the Institute of Nanoscale Science and Technology at Flinders University.

"The coating is solvent resistant and can also remove mercury from oil and water mixtures, which is of importance to remediation in the petroleum and gas industry."

Mr Mann conducted part of this study in the UK on an exchange at Dr. Tom Hasell's University of Liverpool lab as part of ongoing collaboration between the Chalker Lab and Hasell Lab in Liverpool.

**More information:** Maximilian Mann et al, Processes for coating surfaces with a copolymer made from sulfur and dicyclopentadiene, *Polymer Chemistry* (2021). DOI: 10.1039/D1PY01416A

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