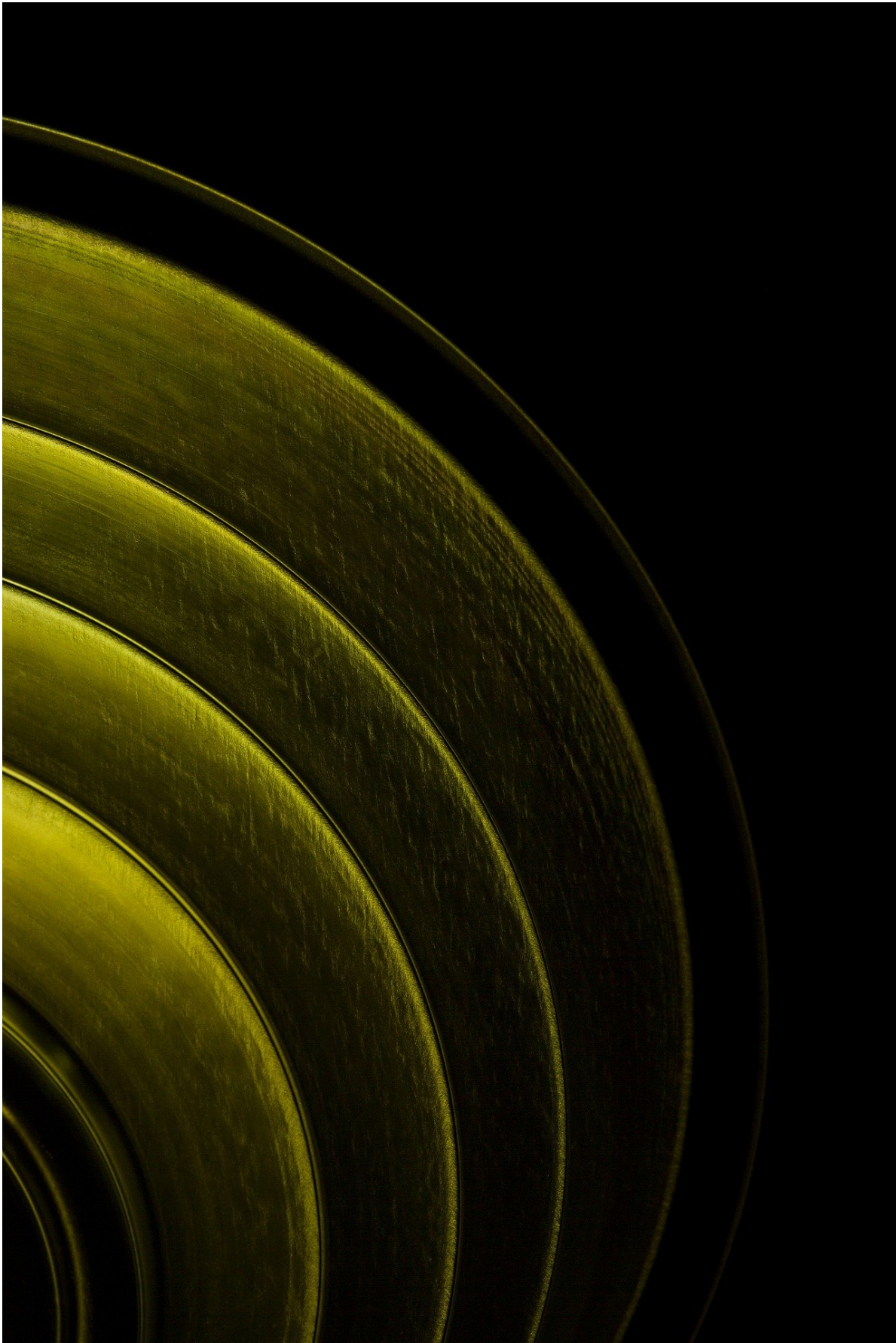


Scientists develop industrial-strength adhesive which can be unstuck in magnetic field

November 4 2019



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Researchers at the University of Sussex have developed a glue which can unstick when placed in a magnetic field, meaning products otherwise destined for landfill, could now be dismantled and recycled at the end of their life.

Currently, items like mobile phones, microwaves and car dashboards are assembled using adhesives. It is a quick and relatively cheap way to make products but, due to problems dismantling the various materials for different recycling methods, most of these products will be destined for landfill.

However, Dr. Barnaby Greenland, Lecturer in Medicinal Chemistry, working in conjunction with Stanelco RF Technologies Ltd and Prof Wayne Hayes at the University of Reading, may have found a solution.

In a new research paper, published by the European Polymer Journal, Dr. Greenland and the team describe a new type of adhesive which contains tiny particles of metal. When passed through an alternating [electromagnetic field](#), the [glue](#) melts and products simply fall apart.

The adhesive works with plastic, wood, glass and metal and in terms of strength, is comparable to those currently used in industry.

Dr. Greenland said: "In as little as 30 seconds, we can unstick items using a relatively weak magnetic field.

"A [power source](#) connected to an inductor creates the electro-magnetic

field which produces heat in the metal particles within the glue and effectively melts it so that the various materials that were previously held together are separated.

"There's little glue residue left over—although this wouldn't be a problem for metal objects which are melted down for recycling anyway.

"Using these specific levels of magnetic field to heat is also incredibly safe. The energy only heats the [metal](#) specks in the glue, so we could place our bare hands in the field and feel absolutely no heat at all."

In principle, the formula could be applied to any thermal adhesive making it an innovation which could be incorporated into industry relatively easily.

Dr. Greenland said: "In essence, we could have a big conveyor belt of products going through a [magnetic field](#) where they enter fully assembled, and come out the other end completely dismantled.

"We're really excited because the glue has provided a simple and green solution to quite a large problem. At the moment, glued products can often only be dismantled using chemicals so not only are we saving items from going to landfill, but we're also reducing the need to use potentially [harmful substances](#) when it comes to getting rid of products."

The team have also demonstrated that this heating technique can be used to stick items together, and as the project continues, efforts will focus on investigating this process further.

More information: Sara Salimi et al. Composite polyurethane adhesives that debond-on-demand by hysteresis heating in an oscillating magnetic field, *European Polymer Journal* (2019). [DOI: 10.1016/j.eurpolymj.2019.109264](#)

Provided by University of Sussex

Citation: Scientists develop industrial-strength adhesive which can be unstuck in magnetic field (2019, November 4) retrieved 19 April 2024 from <https://phys.org/news/2019-11-scientists-industrial-strength-adhesive-unstuck-magnetic.html>

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