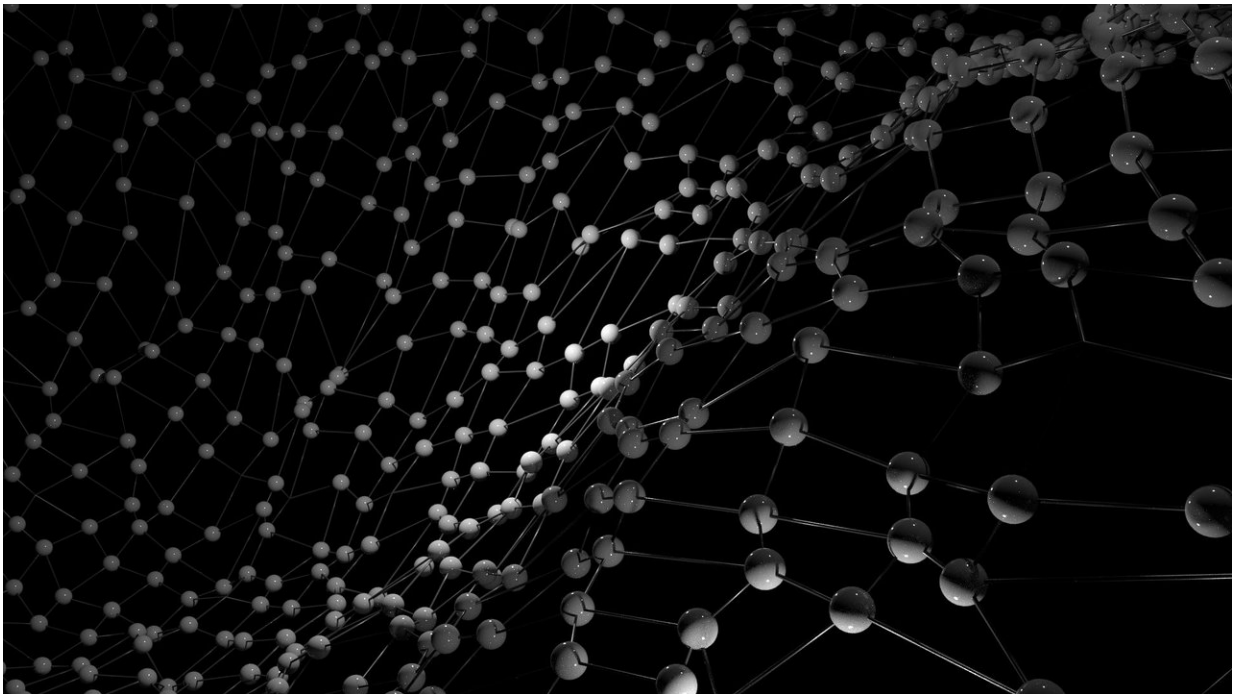


Autonomous self-healing seen in piezoelectric molecular crystals

July 23 2021, by Bob Yirka



Credit: CC0 Public Domain

A team of researchers from the Indian Institute of Science Education and Research in Kolkata, the Indian Institute of Technology Kharagpur and RWTH Aachen University, has found a type of piezoelectric molecular crystal that is capable of autonomous self-healing. In their paper published in the journal *Science*, the group describes their work with piezoelectric molecular crystals and the crystals they grew that

could heal themselves.

As the researchers note, self-healing materials have become the object of intense research in recent years. Such efforts have yielded some results—polymers, gels and other materials have been developed which, when injured, can heal themselves to some degree. To date, such successes have all had one thing in common—they are all soft. In this new effort, the researchers tackled a much more difficult task: finding or developing a self-healing hard material. In this case, that meant figuring out how to get a dense material, made of molecules arranged in a regular way, to heal when ripped apart.

The work by the team involved studying piezoelectric molecular crystals—a type of crystal that is capable of converting [mechanical energy](#) into electricity. The crystals used in microphones are one such example. The researchers reasoned that the inherent properties of such crystals should lend themselves to self-healing because of their attractive forces. After much trial and error, the researchers settled on bipyrazole organic crystals. They then grew sample crystals in tiny (2mm long by 0.2mm wide) needle shapes. Next, they applied just enough pressure to their test crystals to make them break, and then watched as they bounced back from the break into straight-line needles again, with no evidence of the break remaining. Testing of the crystal with a polarization microscope system showed that the material had truly healed.

It is not clear yet if the type of crystals produced by the team in India will be useful in any given product, but they note that their work shows that piezoelectric molecular crystals can be grown in ways that allow for [self-healing](#). They suggest such crystals could likely find use in optical and nanoprobng devices. There is also a slight possibility that such a material could one day be used in video screens, allowing smartphones to heal themselves after cracking when dropped.

More information: Surojit Bhunia et al, Autonomous self-repair in piezoelectric molecular crystals, *Science* (2021). [DOI: 10.1126/science.abg3886](https://doi.org/10.1126/science.abg3886)

© 2021 Science X Network

Citation: Autonomous self-healing seen in piezoelectric molecular crystals (2021, July 23)
retrieved 2 May 2024 from
<https://phys.org/news/2021-07-autonomous-self-healing-piezoelectric-molecular-crystals.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.