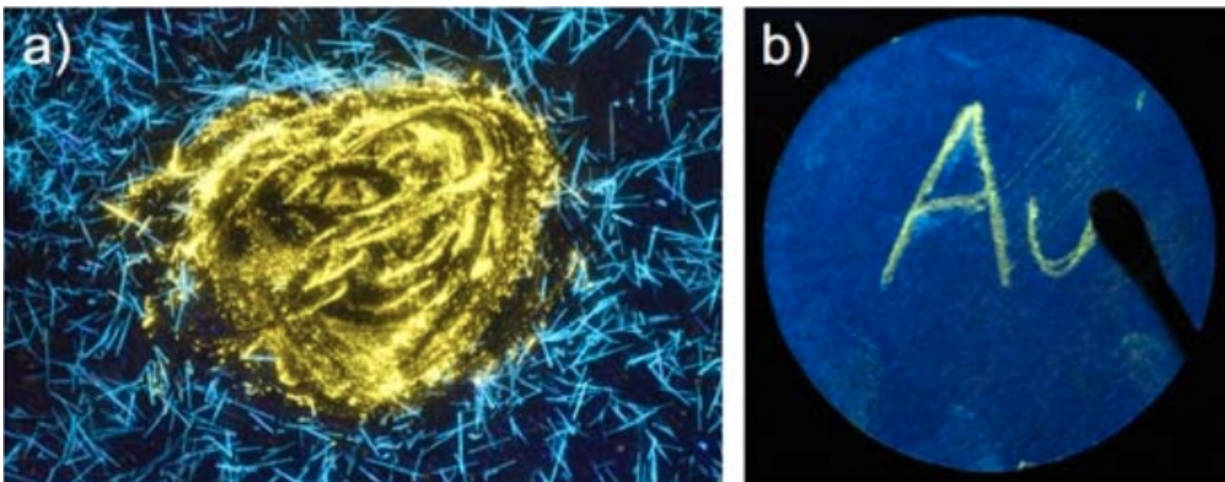


Changing colours of light

July 14 2016



Changes in colors emitted through mechanochromism a) When the blue crystal in emission was ground at the centre, the colour turned yellow. b) A round filter paper thinly coated with blue mechanochromic molecules in emission. The yellowish letters “Au” appeared after scratching the surface with a spatula. Credit: ResearchSEA

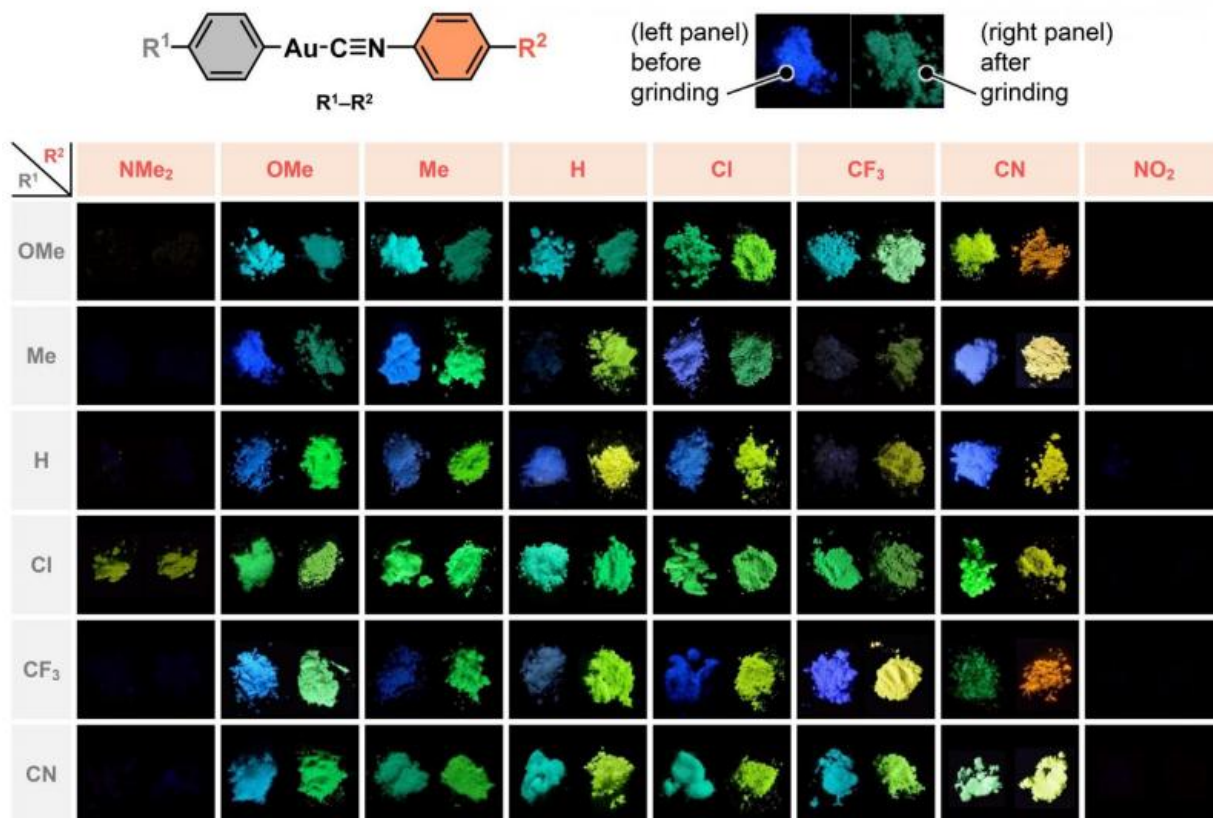
In a phenomenon known as mechanochromism, certain solid and liquid crystalline materials change their photoluminescence properties upon mechanical stimulation, such as grinding, ball-milling and crushing. Although such compounds have attracted much attention with hopes of various applications, it has heretofore been thought difficult to synthesize mechanochromic compounds with desired emission properties and behaviours as each molecule emits different colours.

A team of scientists at Hokkaido University in Japan synthesized 48 [organic compounds](#) containing gold atoms, or gold(I) isocyanide complexes—28 of which were found to be mechanochromic, emitting changing colours such as blue, green, yellow and orange upon stimulation.

With the aim of unraveling the mechanism behind the colour changes, the researchers conducted detailed analyses of the crystal structures of almost all the molecules in the studied compounds. They found various formations of molecular arrangements, which, they concluded, is key to understanding the changes in their photoluminescence properties.

Their findings could be applied to develop a sensor for detecting minute forces that occur in a several-nanometre segment in the cells—currently regarded as a difficult task. "If such a sensor is developed, it will contribute to identifying the mechanism for cellular movements and such," said the research paper's co-author Hajime Ito.

The research results were published in May in the *Journal of the American Chemical Society* and included in "JACS Spotlights." The article was also selected as part of the "ACS Editors' Choice" program.



48 organic compounds containing gold atoms, or gold(I) isocyanide complexes. 28 of the compounds were found to be mechanochromic, emitting changing colours. Compounds before and after mechanical stimulation are shown on the left and right in each panel, respectively. Credit: Seki T., Takamatsu Y., Ito H., *Journal of the American Chemical Society*, May 10, 2016

More information: Tomohiro Seki et al. A Screening Approach for the Discovery of Mechanochromic Gold(I) Isocyanide Complexes with Crystal-to-Crystal Phase Transitions, *Journal of the American Chemical Society* (2016). DOI: [10.1021/jacs.6b02409](https://doi.org/10.1021/jacs.6b02409)

Provided by Hokkaido University

Citation: Changing colours of light (2016, July 14) retrieved 16 July 2024 from <https://phys.org/news/2016-07-colours.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.