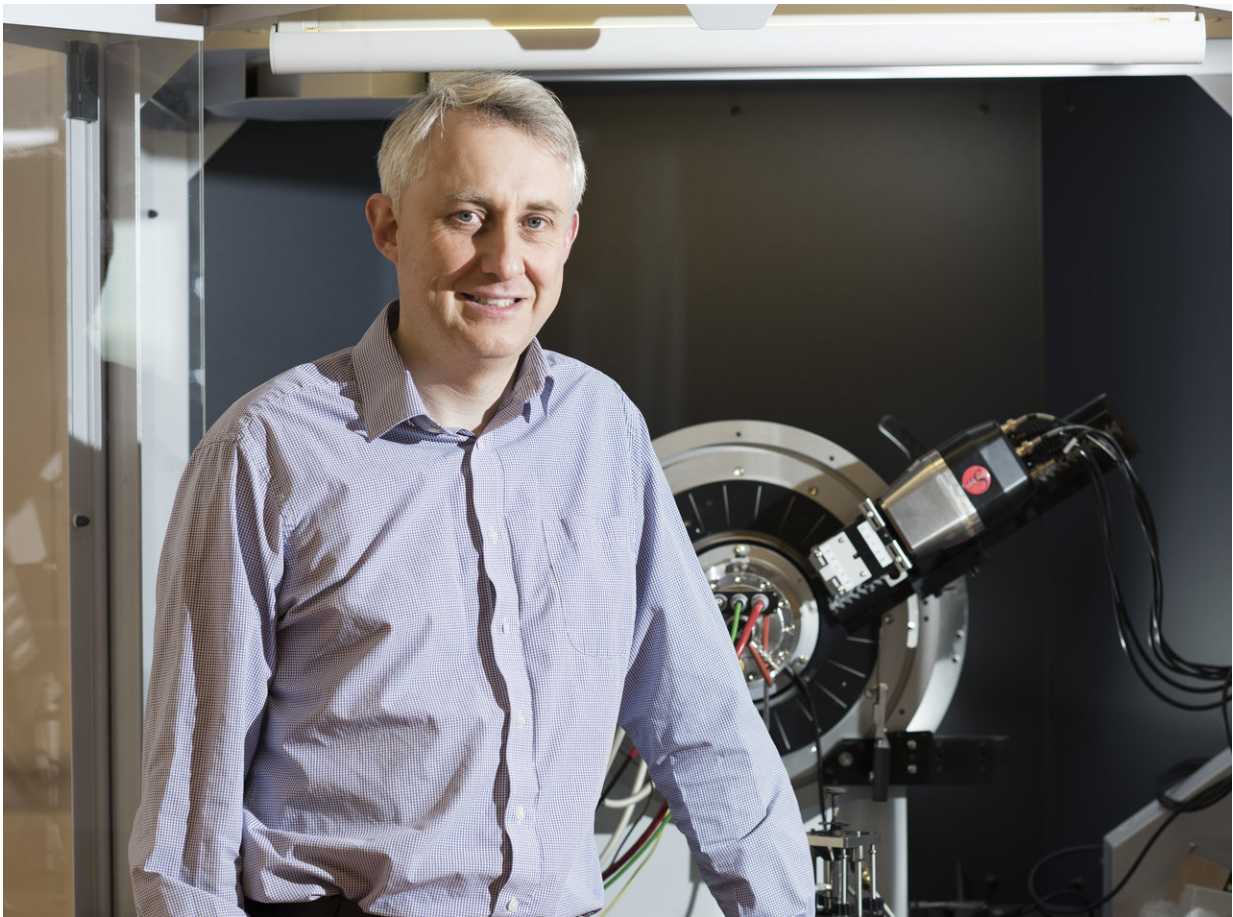


More electronic materials opened up with new metal-organic framework

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Professor Richard Walton, University of Warwick. Credit: University of Warwick

More materials for electronic applications could be identified, thanks to

the discovery of a new metal-organic framework (MOF) that displays electrical semiconduction with a record high photoresponsivity, by a global research collaboration involving the University of Warwick.

Research published today in *Nature Communications* shows how high photoconductivity and semiconductor behaviour can be added to MOFs—which already have a huge international focus for their [applications](#) in [gas storage](#), sensing and catalysis.

The new work, conducted by Universities in Brazil, the United Kingdom and France – including researchers at Warwick's Department of Chemistry—found that the new MOF has a photoresponsivity of $2.5 \times 10^5 \text{ A.W}^{-1}$ - the highest ever observed.

The MOF has been prepared using cobalt (II) ions and naphthalene diimides and acid as ligands. The structure shows anisotropic redox conduction, according to the directions of the crystal lattice. The conduction mechanism is sensitive to light, and may be modified or modulated according to the incident wavelength.

Photoactive and semiconducting MOFs are rare but desirable for electrical and photoelectrical devices.

These results are the first of this kind concerning MOFs and are the starting point for the possibility of discovery of even more functional materials, displaying properties suitable for practical applications.

The potential for use in electronic components and photoconversion devices, such as solar cells and photocatalysts provides a very exciting future for such materials.

Professor Richard Walton, from Warwick's Department of Chemistry, commented:

"The material we have discovered paves the way for new applications of a topical family of materials in many areas ranging from technology to energy conversion. We illustrate how MOFs that combine organic and inorganic components can produce unique functional materials from readily available chemicals.

"Our work was underpinned by Warwick's strengthening collaborative links with Brazilian universities and our exceptional equipment for [materials](#) analysis."

More information: Evandro Castaldelli et al. Electrical semiconduction modulated by light in a cobalt and naphthalene diimide metal-organic framework, *Nature Communications* (2017). [DOI: 10.1038/s41467-017-02215-7](https://doi.org/10.1038/s41467-017-02215-7)

Provided by University of Warwick

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