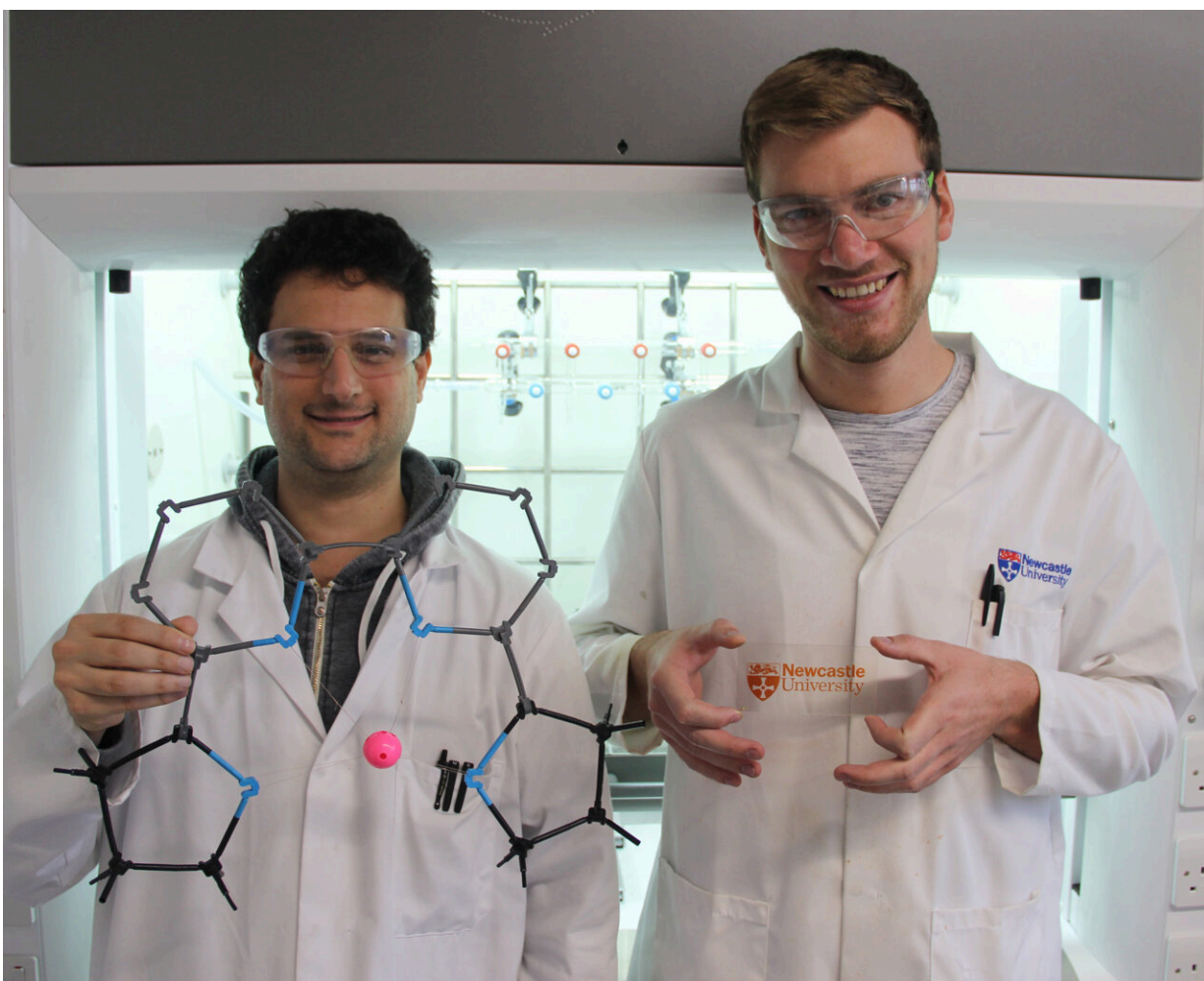


Making solar energy even more sustainable with light-powered technology

November 16 2021



Dr Iacopo Benesperi (left) and Hannes Michaels holding a model of the complexes. Credit: Newcastle University, UK

Technology using a new generation of hybrid solar cells is one step closer to mass-production, thanks to Newcastle University-led research.

An international team of scientists have identified a new process using coordination materials that can accelerate the use of low-cost, Earth-abundant materials with the potential to transform the [energy sector](#) by replacing silicone-based [solar panels](#).

Publishing their results in the journal *Chem*, the team, led by Newcastle University and colleagues from Uppsala University in Sweden and University of Naples Federico II, Italy, developed dynamic dimeric copper complexes using tetradentate ligands (the ligands that bind four donor atoms). These new copper systems offer a novel combination of fast charge transport in an unprecedented two-electron redox mechanism while inhibiting carrier recombination after disproportionation.

The dynamic dimer system represents a new generation of efficient redox mediators for molecular devices. It can help power photovoltaic devices with minimal voltage losses, with comparably low reorganization energies and recombination rates.

Study co-lead, Dr. Marina Freitag, from Newcastle University's School of Natural and Environmental Sciences, said: "The majority of progress toward the goal of using low-cost and abundant materials has come from improving light-absorbing materials. Charge transfer issues remain a barrier to widespread adoption of this solar technology, and this is the challenge that our research addresses."

Study co-lead, Prof Ana Belén Muñoz-García, from University of Naples Federico II, said "This work proves that [fundamental research](#) combining experiments and theory can provide solid scientific grounds to optimize materials and interfaces for [renewable energy technologies](#) with real impact on the society."

More information: Iacopo Benesperi et al, Dynamic dimer copper coordination redox shuttles, *Chem* (2021). [DOI: 10.1016/j.chempr.2021.10.017](https://doi.org/10.1016/j.chempr.2021.10.017)

Provided by Newcastle University

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