Researchers show the value of perovskite solar cells in addressing global environmental challenges

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A new study from the University of Sheffield has confirmed the potential for Perovskite solar cells (PSCs) to be a 'game changer' in addressing global environmental challenges.

PSCs, a recent innovation in solar energy, have been praised for being easier and cheaper to produce than other photovoltaic solar cells – but testing of these claims has been limited.

Therefore, a team of researchers, including Dr Taofeeq Ibn Mohammed, Professor Lenny Koh and Professor Ian Reaney from the University of Sheffield, alongside collaborators from the universities of Kent, Nottingham and Leicester, investigated their potential and shortcomings.

The team compared PSCs with other existing photovoltaic technologies, including an examination of the kind of materials used in their production, how difficult it is to manufacture them, and how much it costs to produce and manufacture them. They also carried out a systematic hybrid life cycle assessment of PSCs, meaning that every aspect associated with PCSs, including greenhouse gas emission, material use, land use, pollution and toxicology, was considered.

They found PSCs are a more environmentally friendly, sustainable option for generating energy and they were shown to have the shortest energy payback period of all solar technologies tested in the study. The findings were published in the journal Renewable and Sustainable Energy Reviews.

Professor Ian Reaney, from the University of Sheffield's Department of Materials Science and Engineering, explained: "In science we make a lot of assumptions about the environmental credentials of new technologies. With hybrid life cycle assessment, we can make rational decisions based on quantitative data and it is now clear that PSCs are a potential game changer for the solar cell community."

Professor Lenny Koh from the University of Sheffield's Management School, added: "Renewable energy technology such as solar cells can play a significant role in delivering future energy security.

"As the race for different types of PV technology intensifies to fill major international demand, important questions on their environmental and economic efficiencies need to be addressed. Our research found that perovskite solar cells not only are the most environmentally sustainable, they have the shortest payback period of less than a year."

More information: T. Ibn-Mohammed et al. Perovskite solar cells: An integrated hybrid lifecycle assessment and review in comparison with other photovoltaic technologies, *Renewable and Sustainable Energy Reviews* (2017). DOI: 10.1016/j.rser.2017.05.095

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