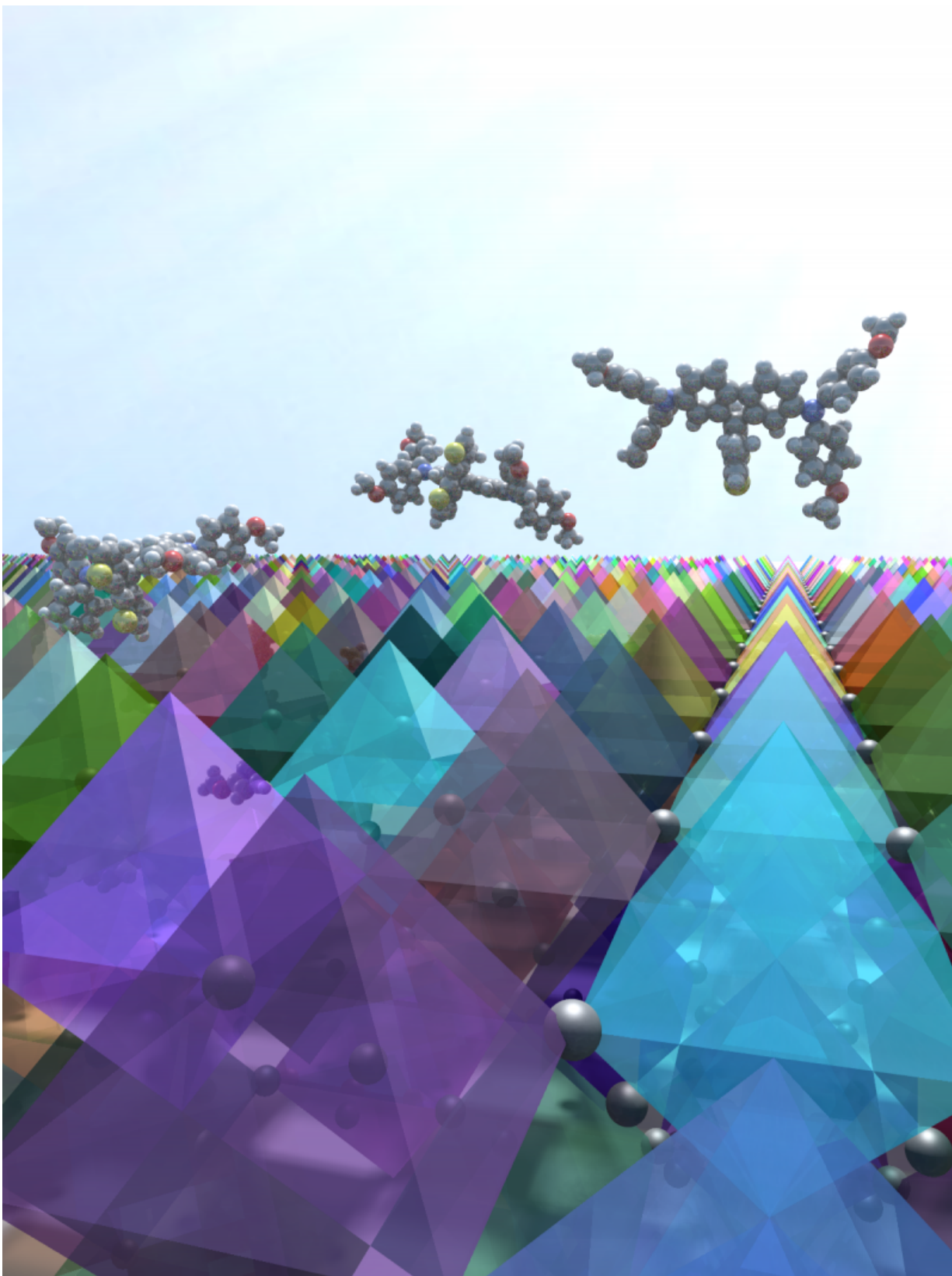


# **Cheaper solar cells with 20.2 percent efficiency**

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3-D illustration of FDT molecules on a surface of perovskite crystals. Credit: Sven M. Hein  
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EPFL scientists have developed a solar-panel material that can cut down on photovoltaic costs while achieving competitive power-conversion efficiency of 20.2%.

Some of the most promising [solar cells](#) today use light-harvesting films made from perovskites - a group of [materials](#) that share a characteristic molecular structure. However, perovskite-based solar cells use expensive "hole-transporting" materials, whose function is to move the positive charges that are generated when light hits the perovskite film. Publishing in *Nature Energy*, EPFL scientists have now engineered a considerably cheaper hole-transporting material that costs only a fifth of existing ones while keeping the [efficiency](#) of the solar cell above 20%.

As the quality of perovskite films increases, researchers are seeking other ways of improving the overall performance of solar cells. Inadvertently, this search targets the other key element of a solar panel, the hole-transporting layer, and specifically, the materials that make them up. There are currently only two hole-transporting materials available for perovskite-based solar cells. Both types are quite costly to synthesize, adding to the overall expense of the solar cell.

To address this problem, a team of researchers led by Mohammad Nazeeruddin at EPFL developed a molecularly engineered hole-transporting material, called FDT, that can bring costs down while keeping efficiency up to competitive levels. Tests showed that the efficiency of FDT rose to 20.2% - higher than the other two, more expensive alternatives. And because FDT can be easily modified, it acts as a blueprint for an entire generation of new low-cost hole-transporting

materials.

"The best performing perovskite solar cells use hole transporting materials, which are difficult to make and purify, and are prohibitively expensive, costing over €300 per gram preventing market penetration," says Nazeeruddin. "By comparison, FDT is easy to synthesize and purify, and its cost is estimated to be a fifth of that for existing materials - while matching, and even surpassing their performance."

**More information:** Saliba M, Orlandi S, Matsui T, Aghazada S, Cavazzini M, Correa-Baena J-P, Gao P, Scopelliti R, Mosconi E, Dahmen KH, De Angelis F, Abate A, Hagfeldt A, Pozzi G, Graetzel M, Nazeeruddin MK. A molecularly engineered hole-transporting material for efficient perovskite solar cells. *Nature Energy* 15017, 18 January 2016. [DOI: 10.1038/NENERGY.2015.17](https://doi.org/10.1038/NENERGY.2015.17)

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