# Article information:

Radical polymeric p-doping and grain modulation for stable, efficient perovskite solar modules | Science  
<https://www.science.org/doi/10.1126/science.add8786>

# Article summary:

1. Shuai You et al. developed two additives for perovskite modules to enhance their performance: a fullerene derivative with a phosphonate group and a polypropylene oxide polymer substituted with a redox active species.

2. The additives accelerated electron transfer across grain boundaries in the perovskite film and facilitated p-doping of the hole transport layer, respectively.

3. Large-area modules (17 square centimeters) had power-conversion efficiencies of up to 21.4%, and retained 95% of their efficiency after more than 3000 hours of continuous illumination at elevated temperature.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article is generally reliable and trustworthy, as it is based on research conducted by Shuai You et al., which was published in Science magazine, one of the most prestigious scientific journals in the world. The authors are all highly qualified experts in their respective fields, and they provide detailed information about their research methods and results. Furthermore, the article includes citations from other relevant studies that support its claims.

However, there are some potential biases that should be noted. For example, the authors do not discuss any possible risks associated with using these additives or any potential environmental impacts that could result from their use. Additionally, while the authors provide evidence for their claims, they do not explore any counterarguments or present both sides of the argument equally; instead, they focus solely on supporting their own findings without considering alternative perspectives or interpretations of the data presented in this study. Finally, there is some promotional content included in the article; for example, at the end of the article there is an advertisement for signing up for Science eTOC newsletter which may be seen as an attempt to increase readership rather than providing additional information related to this study's findings.

# Topics for further research:

* Environmental impacts of food additives
* Risks associated with food additives
* Alternative perspectives on food additives
* Counterarguments to food additives research
* Food additives and public health
* Food additives and consumer safety

# Report location:

<https://www.fullpicture.app/item/1e614c46fda631e654a7786e0844a6cd>