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## Perovskite-polymer mashup makes for full-color tunable LED film

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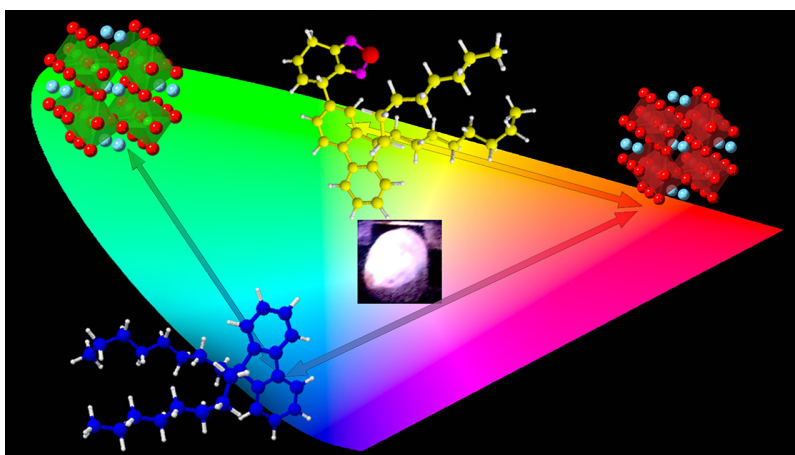


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**Blending perovskite colloidal nanocrystals and polymers yields materials whose photoluminescence is the superposition of its components.**



Organic light-emitting diodes (LED) make possible the thin color screens used in televisions and cell phones. Perovskite colloidal nanocrystals are interesting materials for LED films, despite a few physical drawbacks and a lack of methodical investigation into their characteristics. A study reported in *Applied Physics Letters*, intended to initiate such a methodical investigation, demonstrates how a blended perovskite nanocrystal-polymer material overcomes the perovskite-specific issues. The materials can emit colors spanning the visible color range and in some cases white light. The results also show that the emitted color is determined by the superposition of the photoluminescence from each of the blend's components, allowing for an easy way to tune the emitted color.

Perovskite nanocrystals have high photoluminescence quantum yields, good charge mobility values, and narrow emissions lines. However, perovskite-only films are subject to small holes that reduce electroluminescence and are difficult to deposit uniformly. Building on work by others that showed perovskite-polymer blends make more uniform films, the researchers created three perovskite nanocrystal-polymer blends. They excited each blend with a 337-nanometer laser and measured the resulting photoluminescence. They did the same for each of the blend's components. In addition, they measured time-resolved photoluminescence to calculate the energy-transfer efficiency of each blend.

The measured spectra demonstrate that the blend's spectrum is the superposition of the polymer and perovskite spectra. Taken together, these results show that the perovskite-polymer blend integrates the ability of the polymer components to create a uniform film with the wide emission range possible to both components in a single-layer film.

**Source:** "Full color tuning in binary polymer:perovskite nanocrystals organic-inorganic hybrid blends," by A. Perulli, A. Balena, M. Fernandez, G. Nedelcu, A. Cretí, M. V. Kovalenko, M. Lomascolo, and M. Anni, *Applied Physics Letters* (2018). The article can be accessed at <https://doi.org/10.1063/1.5020201>.

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