Building a better light bulb

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Scientists study the movement of charge carriers to design an organic LED that is energy efficient and still casts a warm, natural glow.

Incandescent light bulbs are energy hogs, but many people prefer them for the cozy quality of light they emit. Scientists from Dresden University of Technology in Germany have set out to build energy efficient organic LED (OLED) lights that could rival incandescent bulbs in white-light color quality.

OLEDs consist of many layers of organic materials with different electrical properties. Excited electrons move through the materials and when the electrons are reunited with positive "holes," they emit electromagnetic radiation in the form of visible light.

To build their white light OLED, the researchers used four separate emitter layers: blue, green, yellow, and red. The different colors are combined to cover all parts of the visible spectrum. Through a detailed study of the movement of electrons through the OLED, the scientists were able to tune the color and quality of the light by adjusting the height of the layers.

The final OLED, described in the AIP's Journal of Applied Physics, casts a color of light very near to warm white point A, a standard measure of the white light spectrum reached by some incandescent bulbs. The OLED also has high color stability, meaning the light can be dimmed without noticeably altering its quality.

More information: "Organic LEDs for Lighting: High Color Quality by Controlling Energy Transfer Processes in Host-Guest-Sytems" is accepted for publication in the *Journal of Applied Physics.*

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