

Low-cost quantum dot windows could power a solar future

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Solar cells are normally installed in the form of rooftop modules. Rooftop solar panels, however, suffer from a major roadblock on the path to a renewable energy future for one simple reason: rooftop space is severely limited in large, densely populated cities, such as New York or London. On the other hand, modern skyscrapers feature enormous amounts of window space. Newly developed luminescent solar concentrators can help turn these large glass facades into power generation units. Window-based collectors have the potential to far exceed the output of rooftop panels in major cities as a result of the larger surface area.

To transform a window into a luminescent solar concentrator, our team at Los Alamos National Laboratory has developed a technique for depositing a layer of a fluorescent material on the glass surface. The layer absorbs sunlight and re-emits longer-wavelength photons that are trapped in the window glass and guided to the edges, where they are collected by solar cells integrated into a window frame. The window in this scheme acts as a large-area sunlight collector. When coupled to photovoltaics that convert light into electrical current, it can become a source of electricity, much like common rooftop solar panels.

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