Semi-transparent and flexible solar cells made from atomically thin sheet

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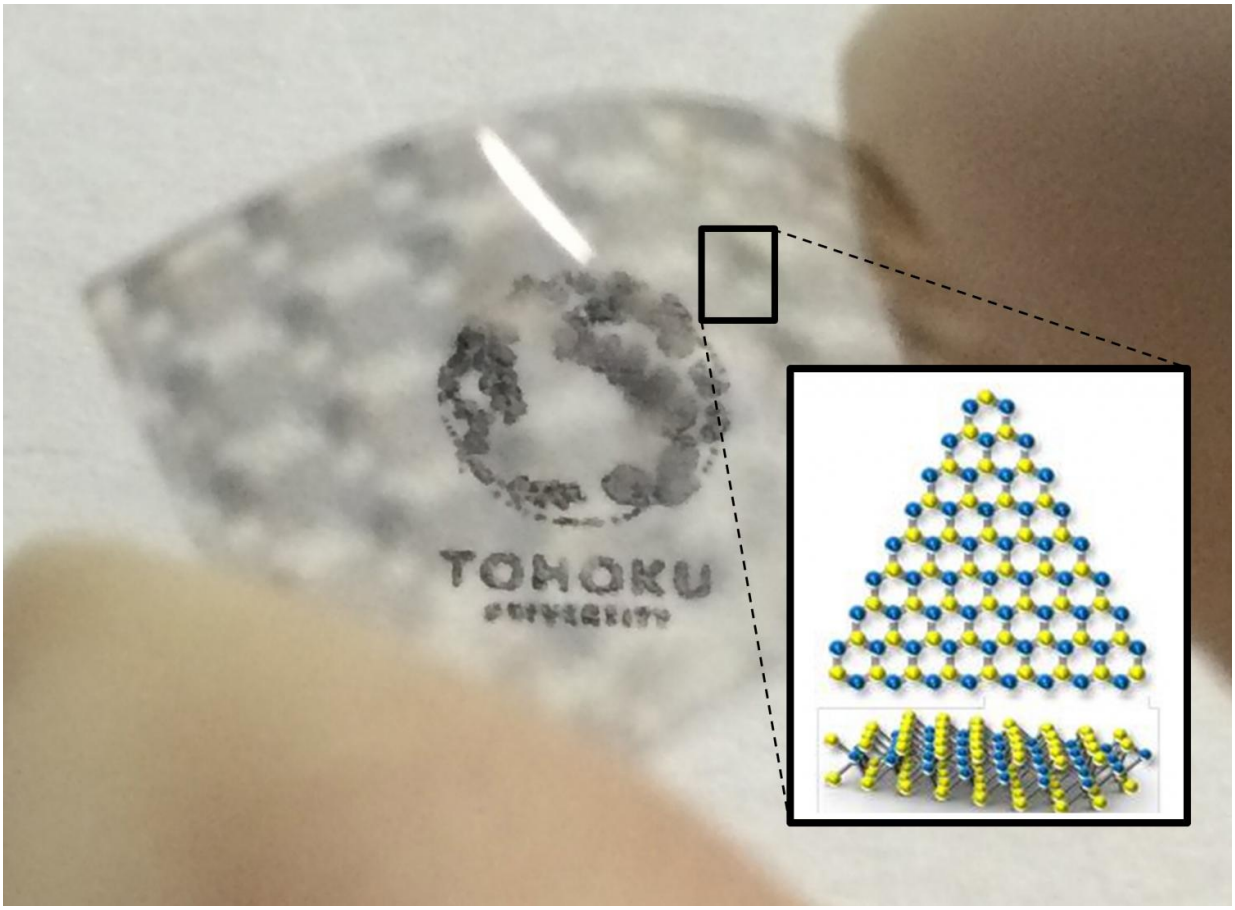

Semitransparent and flexible solar cell with 2-D sheet. Credit: Toshiaki Kato

Researchers at Tohoku University have developed an innovative method for fabricating semitransparent and flexible solar cells with atomically

thin 2-D materials. The new technology improves power conversion efficiency of up to 0.7 percent, the highest value for solar cells made from transparent 2-D sheet materials.

Transparent or semi-transparent solar cells with excellent mechanical flexibility have attracted much attention as next-generation smart solar cells. They can be used on the surfaces of windows, front display panels of personal computers and cellphones, and human skin. But issues remain with regard to improving their power conversion efficiency, optical transparency, flexibility, stability and scalability.

Led by Associate Professor T. Kato, the team showed easy and scalable fabrication of semi-transparent and flexible solar cells using transition metal dichalcogenides (TMDs), an atomically thin 2-D material. Using a Schottky-type configuration, power conversion efficiency can be increased up to 0.7 percent, which is the highest value reported with few-layered TMDs. Clear power generation was also observed for a device fabricated on a large transparent and flexible substrate.

"Since our device structure, the Schottky-type solar cell, is very simple, the TMD-based Schottky-type solar cell possesses good properties for scalability, which is one of the most important elements for use in practical applications," says Kato.

"The transparent and semi-transparent solar cell can be used in a variety of ways. This new type of solar cell is likely to have impact on the technologies we use in daily life in the near future."

More information: Toshiki Akama et al, Schottky solar cell using few-layered transition metal dichalcogenides toward large-scale fabrication of semitransparent and flexible power generator, *Scientific Reports* (2017). DOI: 10.1038/s41598-017-12287-6

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