NREL Highlights

SCIENCE

NREL Makes Substantial Progress in Developing CZTSe Solar Cells

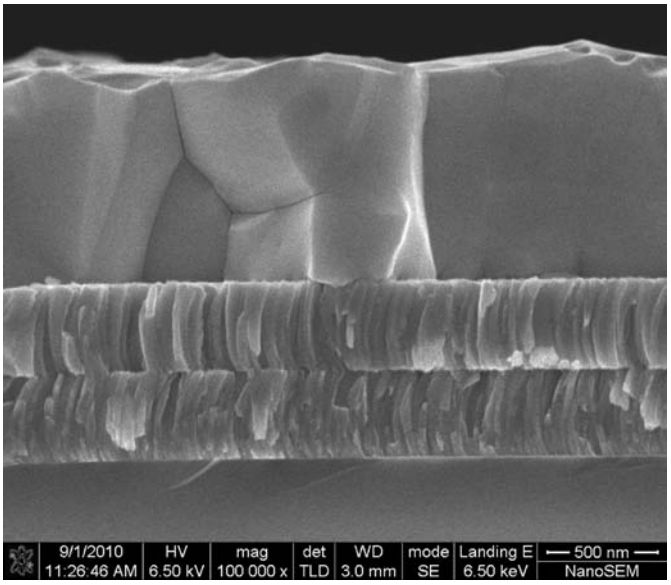
These polycrystalline cells use Earth-abundant elements.

NREL scientists continue to make progress on improving the conversion efficiency of in-house copper zinc tin selenide (CZTSe) solar cells, which are based on non-toxic, Earth-abundant elements.

Recently, NREL demonstrated an 8.4%-efficient CZTSe solar cell produced using commercially acceptable manufacturing techniques. Scientists have advanced the efficiency from zero to 8.4% in just 11 months.

The improvement is a result of focusing on defining the deposition process, which results in good composition control and morphology (as shown in the figure). NREL's next emphasis will be on controlling the surface properties and increasing the band-gap of the material to realize high photovoltage.

Technical Contact: Rommel Noufi, *rommel.noufi@nrel.gov*



Cross-section image of a ~1.5-micrometer-thick polycrystalline CZTSe thin film showing good grain growth. Top layer is CZTSe and the two lower layers are molybdenum.

Key Research Results

Achievement

By defining the deposition process, NREL has significantly improved the conversion efficiency of CZTSe solar cells.

Key Result

NREL has demonstrated an 8.4%-efficient CZTSe cell.

Potential Impact

CZTSe cells use Earth-abundant materials that provide environmental benefits (non-toxicity) and manufacturing benefits (low materials utilization, low cost).

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

1617 Cole Boulevard | Golden, Colorado 80401 | 303-275-3000 | www.nrel.gov

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