New Strategies for CIGS Solar Cells

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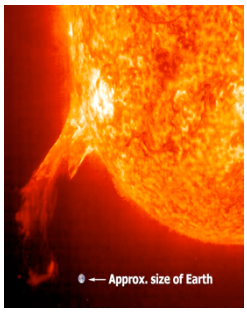
Introduction



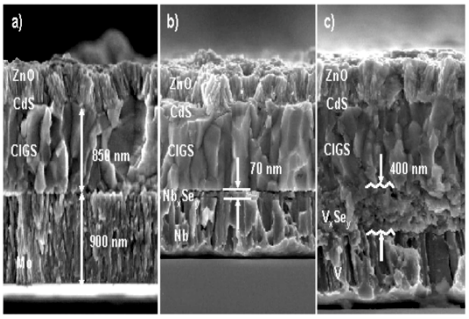
The Earth receives 174 petawatts (10^{15} W) of incoming solar radiation at the upper atmosphere; approximately 30% is reflected back to space. On the other hand, 1000 W/m^2 of sunlight hits the Earth, that means in 1.5 days of sunlight is equal to three trillion barrels of oil. Today, more than 10,000 American families get all of their electricity from solar power.

The development of clean energy resources as alternative to oil has become one of the most important challenges for modern science and technology. The obvious motivation for these efforts is to reduce the air pollution resulting from the mass consumption of fossil fuels. Among the wide variety of renewable energy projects in progress, photovoltaic is the most promising as a future energy technology.

Procedure

We use dicing saw which employs a high-speed spindle fitted with an extremely thin diamond blade to dice glass. Then we use Edwards 500 for sputtering Molybdenum, Zinc Oxide, and ITO on glass covered with CIGS to make the solar cell.

Before CIGS deposition all glass slides were cleaned by the following procedures: sonication in 2% Hallmanex solution (Berlin, Germany) for 15 min and rinsing with Milli-Q-water for 20 times (10 mL each time), after that, sonicating in Milli-Q-water for 15 min, then rinsing with the 100% pure 2-propanol 7 times (10 mL each time). Finally a sonication in 2-propanol for 15 min was carried out and the samples were dried under argon. A solar cell consisting of ITO/ZnO/CdS/CIGS/Mo/glass is presented in this report. The thickness of each layer is: Mo as Back contact (0.7-1 μm), CIGS film (0.5-2 μm), buffer layer of CdS (≈50 nm), window layer of ZnO (0.1 μm), and transparent conductive oxide electrodes of ITO films (0.1 μm). The following figure represents cross-sectional pictures of CIGS solar cells with absorber thickness of 0.9 μm on (a) Mo, (b) Nb, and (c) V on soda lime glass.



References

1. (Poster) M. Harati, L. Lau, and Z. Ding, New Strategies for CIGS Solar Cells, Worldiscoveries Research Showcase, 2009, London, Canada

2. (Talk) M. Harati, L. Lau, and Z. Ding, Preparation and characterization of solar cells based on Cu(In,Ga)Se2 thin films, 2009, 92nd Canadian Chemistry Conference, Hamilton, Canada