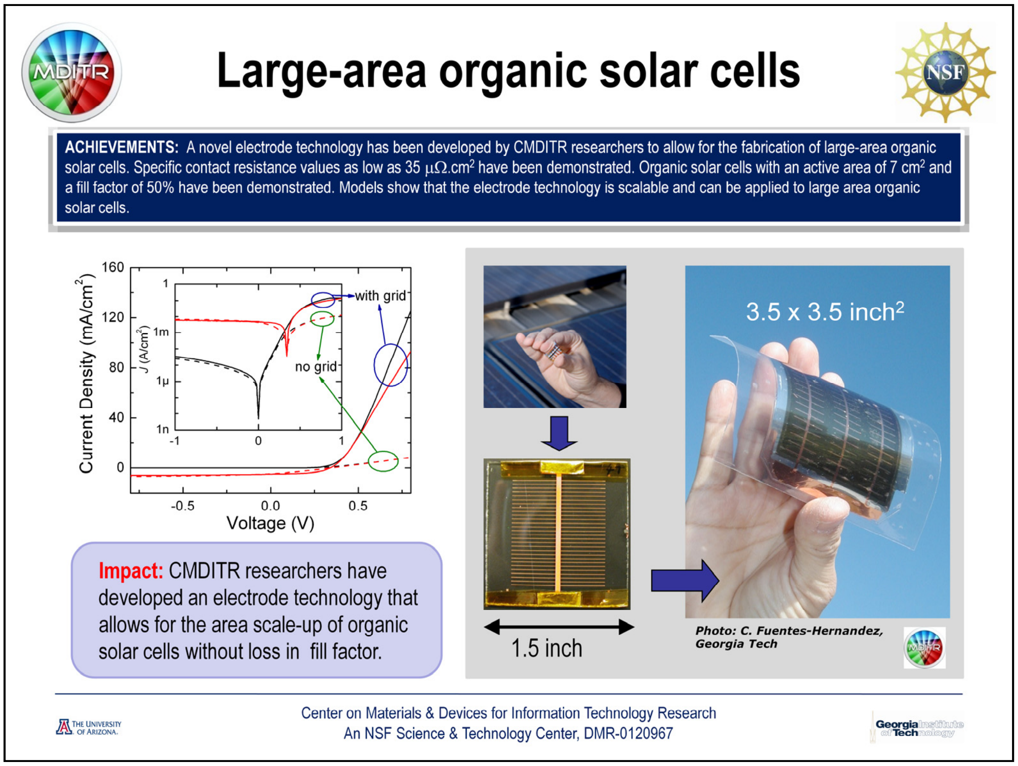

IMPACT: Organic solar cells are an emerging new technology that can lead to a new generation of low cost and highly flexible portable power generation devices. While research in this has been focusing on the optimization of photo-active materials to increase the power conversion efficiency, little attention was given to area scaling and stability. Material optimization is generally achieved in cells with an active area of 0.1 cm^2. Here, CMDITR researchers have developed a new electrode technology that allows for the fabrication of large-area organic solar cells without a reduction of fill factor. Organic solar cells with areas of 80 cm^2 have been fabricated on glass and flexible plastic substrates.

DISCUSSION: Due to the finite sheet resistance of the transparent electrode in a solar cell, the power loss due to the series resistance is increased when the area of the cell is increased. A solution to this problem is to integrate a set of bus bars and electrodes to collect the current. While such electrodes can be directly patterned onto thick Si-based solar cells using screen printing techniques, they cannot be printed on top of organic layers that are much thinner. CMDITR researchers have developed a new technology that is compatible with the manufacturing of organic solar cells. The performance of the new electrode technology was tested with pentacene/C_{60} solar cells and yield power conversion efficiencies of 0.8%. Current work is focusing on their integration with new device architectures with higher efficiency through a collaboration between Georgia Tech and the University of Arizona.

KEY PERSONNEL:

Georgia Tech: Seungkeun Choi, William Potscavage, Bernard Kippelen, Seth Marder, Steve Barlow, Xuan Zhang

University of Arizona: Michael Brumbach, Neal Armstrong