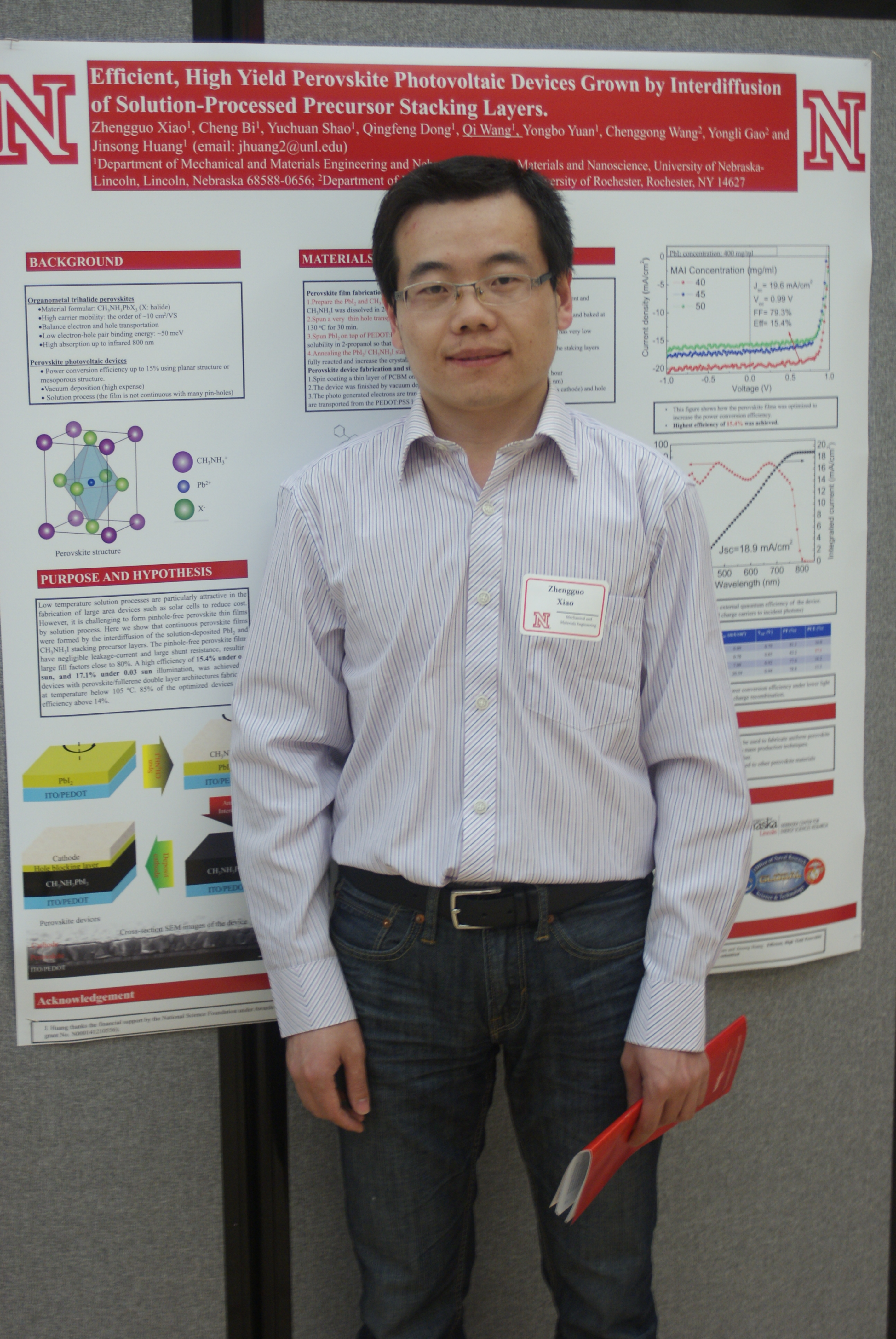
Efficient, High Yield Perovskite Photovoltaic Devices Grown by Interdiffusion of Solution-Processed Precursor Stacking Layers.
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BACKGROUND
Organometal trihalide perovskites
•Material formular: CH3NH3PbX3 (X: halide)
•High carrier mobility: the order of ~10 cm2/VS
•Balance electron and hole transportation
•Low electron-hole pair binding energy: ~50 meV
•High absorption up to infrared 800 nm
Perovskite photovoltaic devices
• Power conversion efficiency up to 15% using planar structure or mesoporous structure.
•Vacuum deposition (high expense)
• Solution process (the film is not continuous with many pin-holes)
CH3NH3+
Pb2+
X-
Perovskite structure
PURPOSE AND HYPOTHESIS
Low temperature solution processes are particularly attractive in the fabrication of large area devices such as solar cells to reduce cost. However, it is challenging to form pinhole-free perovskite thin films by solution process. Here we show that continuous perovskite films were formed by the interdiffusion of the solution-deposited PbI2 and CH3NH3I stacking precursor layers. The pinhole-free perovskite film
MATERIALS
Perovskite film fabricatio
PbI2
ITO/PEDOT
Cathode
Hole blocking layer
CH3NH3PbI3
ITO/PEDOT
Perovskite devices
Cross-section SEM images of the device
Acknowledgement
MAI Concentration (mg/ml)
40
45
50
Jsc= 19.6 mA/cm2
Voc= 0.99 V
FF= 79.3%
Eff= 15.4%
Current density (mA/cm2)
Voltage (V)
Highest efficiency of 15.4% was achieved.
Jsc=18.9 mA/cm2
Wavelength (nm)
Integrated current (mA/cm2)
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