

# Air Processed Organic Solar Cells with Efficiency Higher than 7%

Iordania Constantinou<sup>1</sup>, Tzung-Han Lai<sup>1</sup>, Dewei Zhao<sup>1</sup>, Jesse R. Manders<sup>1</sup>, Erik D Klump<sup>1</sup>, James Deininger<sup>2</sup>, John R. Reynolds<sup>2</sup> and Franky So<sup>1\*</sup>

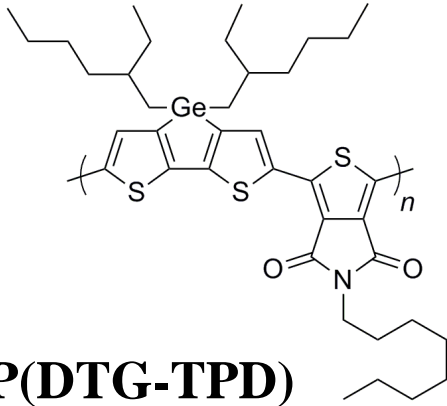
<sup>1</sup>Department of Materials Science and Engineering, University of Florida

<sup>2</sup>School of Chemistry and Biochemistry, School of Materials Science and Engineering, Georgia Institute of Technology

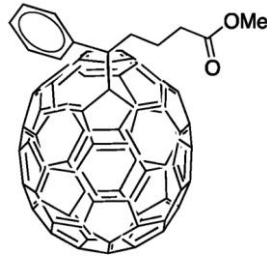
# Materials and Device Structure

## Photoactive Layer

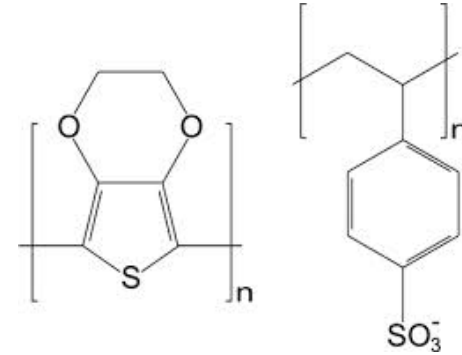
## Hole Transport Layer



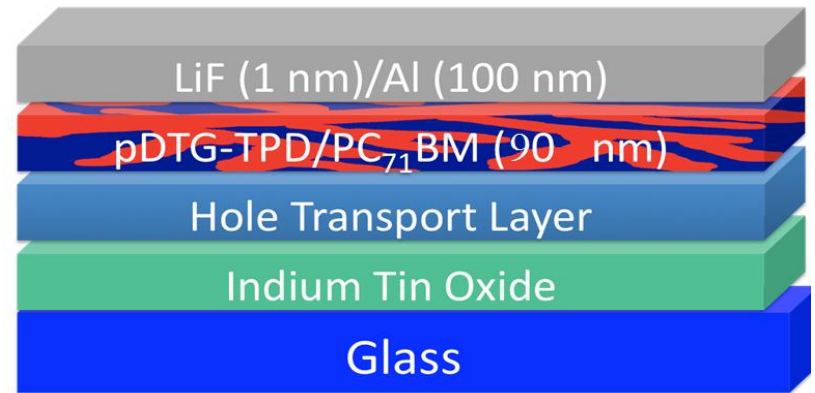
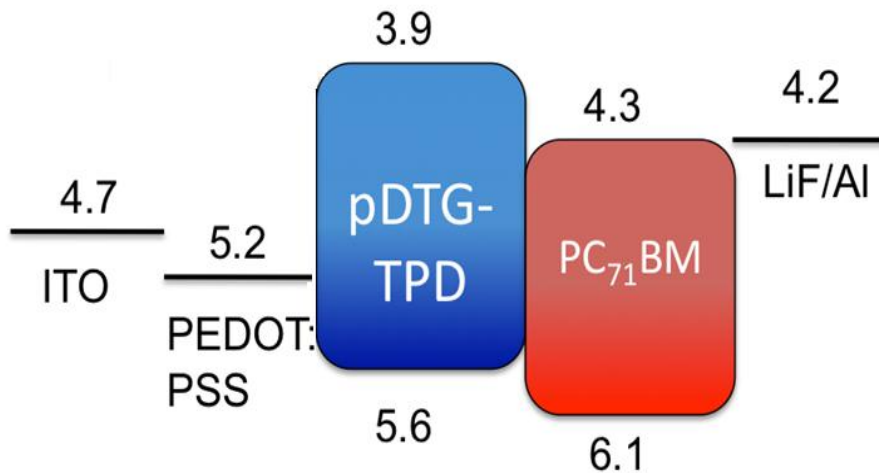
**P(DTG-TPD)**



**PC<sub>70</sub>BM**



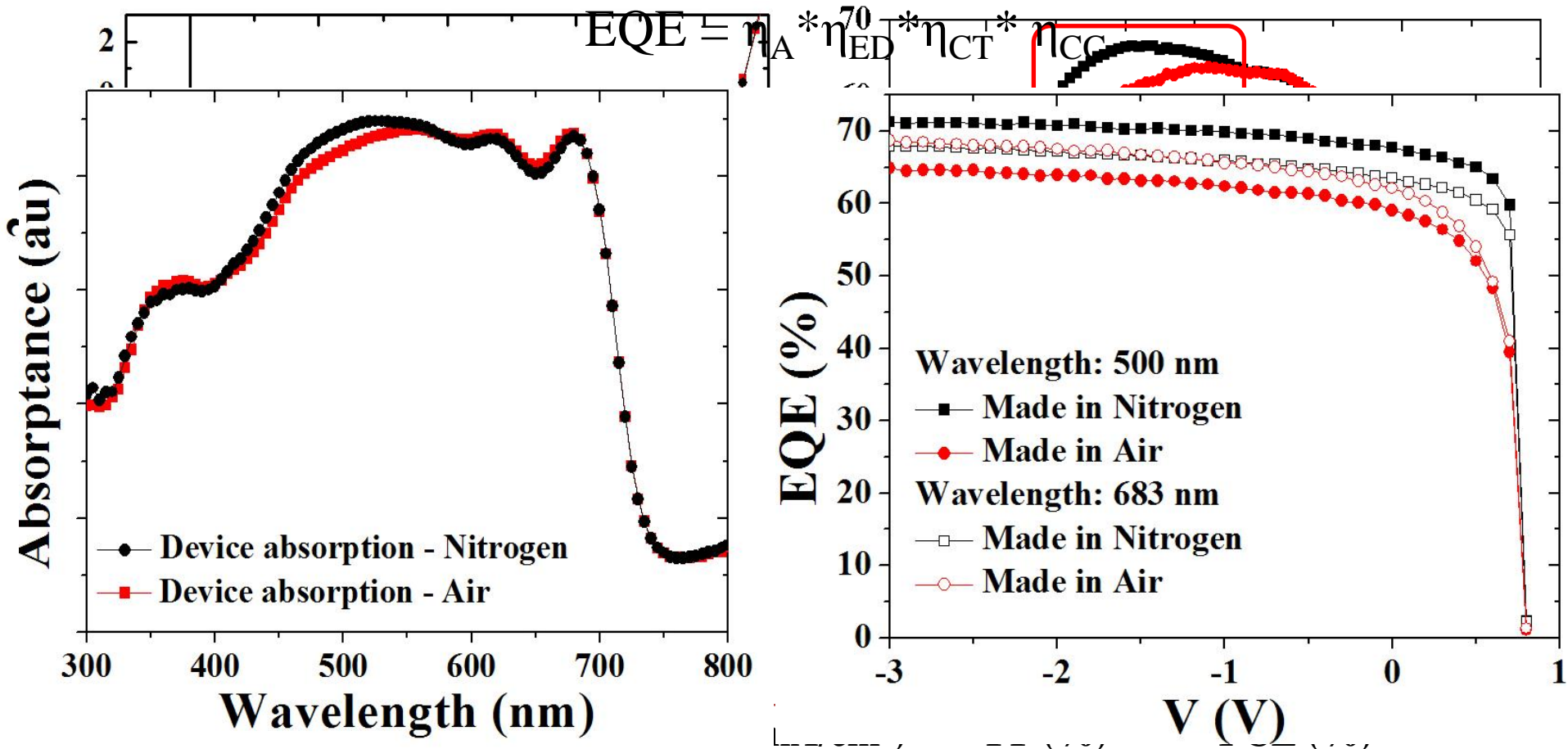
**PEDOT:PSS**



# Absorptance Per Efficiency

ITO / PEDOT:PSS / P(DTG-TPD):PC<sub>70</sub>BM + 5% DIO / LiF / Al

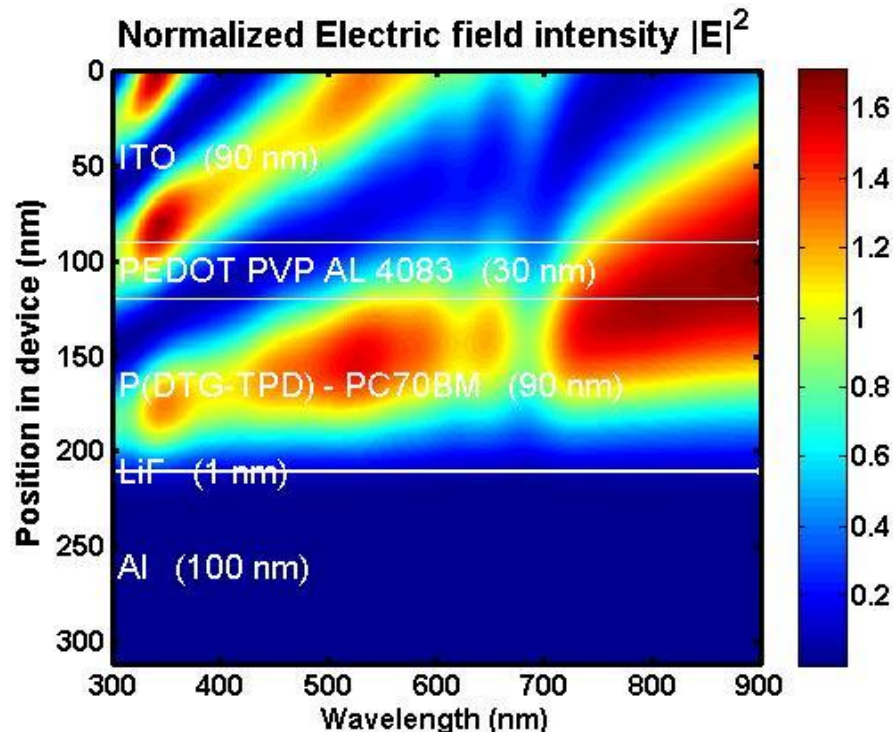
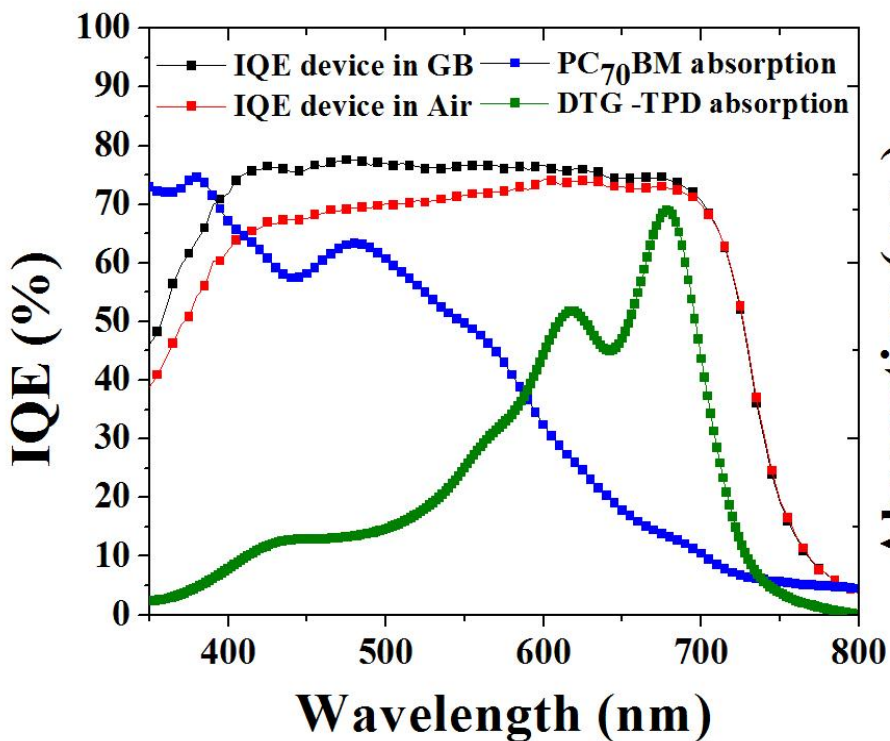
What is affecting EQE at shorter wavelengths?



- Part of the loss in current and short wavelength is due to a decrease in absorption.
- |          |      |      |    |     |
|----------|------|------|----|-----|
| Nitrogen | 0.85 | 16   | 63 | 8.6 |
| Air      | 0.85 | 14.7 | 63 | 7.8 |

# Electrical Effects

$$IQE = EQE / \eta_{Abs}$$



$$J_{SCLC} = \frac{9\mu\epsilon_0\epsilon_r V^2}{8 L^3} \rightarrow$$

	Atmosphere	Nitrogen	Air
$\mu_{hole}$ [ $\text{cm}^2/(\text{Vs})$ ]		$2 \cdot 10^{-4}$	$9 \cdot 10^{-5}$

# Thank you for your attention!



## Special Thanks To:



Dr J. R. Reynolds and Georgia Tech team



## Acknowledgments:

