

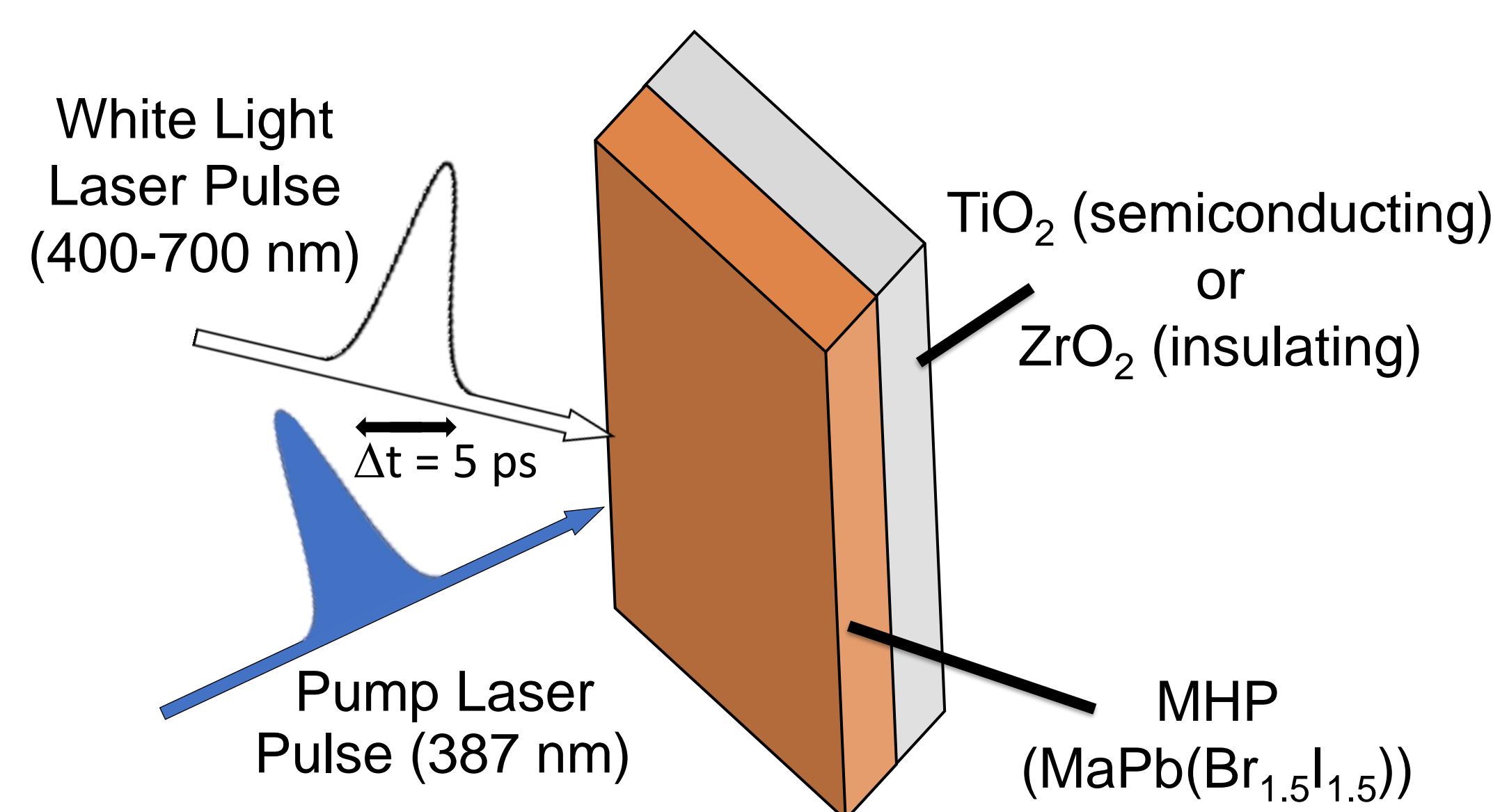
Introduction

- Perovskite solar cells utilize transport layers to extract charges (electrons & holes)
 - Electron transport layer – commonly TiO_2
 - Hole transport layer – commonly spiro-OMeTAD
- Mixed Halide Perovskites (MHPs)** can undergo light-induced phase segregation
- Transport layers influence phase segregation in MHPs when unbalanced charge transport is present

Methods

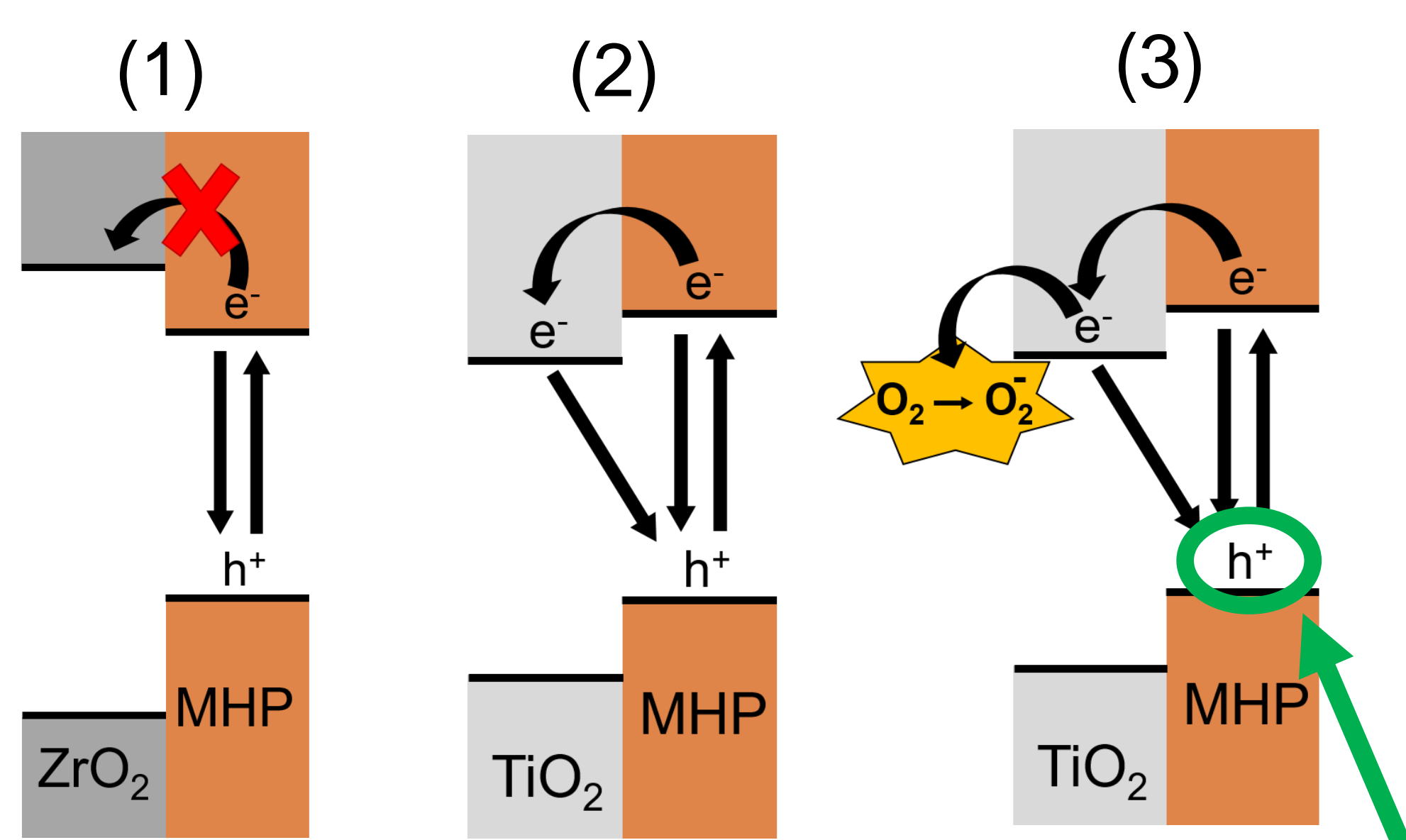
Use Transient Absorption Spectroscopy:

- Induce phase segregation (using 387 nm pulsed laser)
- Track formation of new phases (Br-rich and I-rich) through absorption of excited state (pump-probe technique)



3 conditions studied:

- MHP on ZrO_2 (insulator)
- MHP on TiO_2 (degassed, no O_2 present)
- MHP on TiO_2 (ambient, O_2 present)

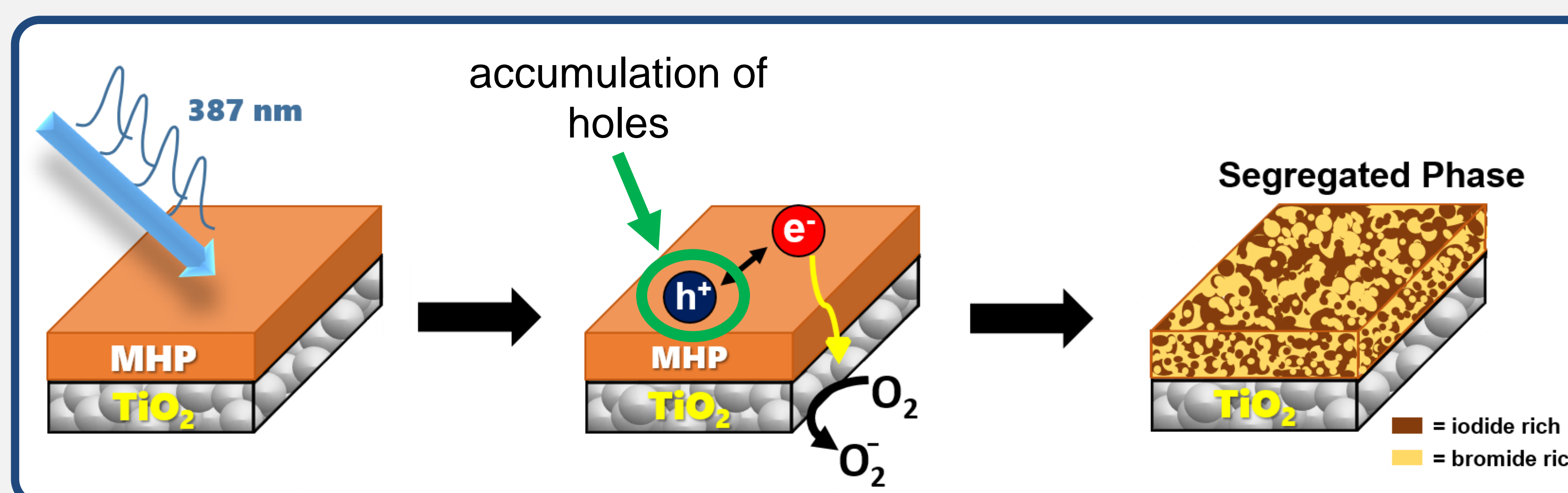


TiO_2 -Assisted Halide Ion Segregation in Mixed Halide Perovskite Films

Jeffrey T. DuBose and Prashant V. Kamat
Department of Chemistry, University of Notre Dame

Phase segregation in Mixed Halide Perovskites (MHPs) is influenced by accumulation of holes

- No phase segregation** for MHP on insulating ZrO_2
- No phase segregation** for MHP on TiO_2 in vacuum (**no O_2 present**)
- Phase segregation** for MHP on TiO_2 in ambient (**with O_2 present**)
- Phase segregation suppressed** for MHP with TiO_2 and spiro-OMeTAD hole transporter



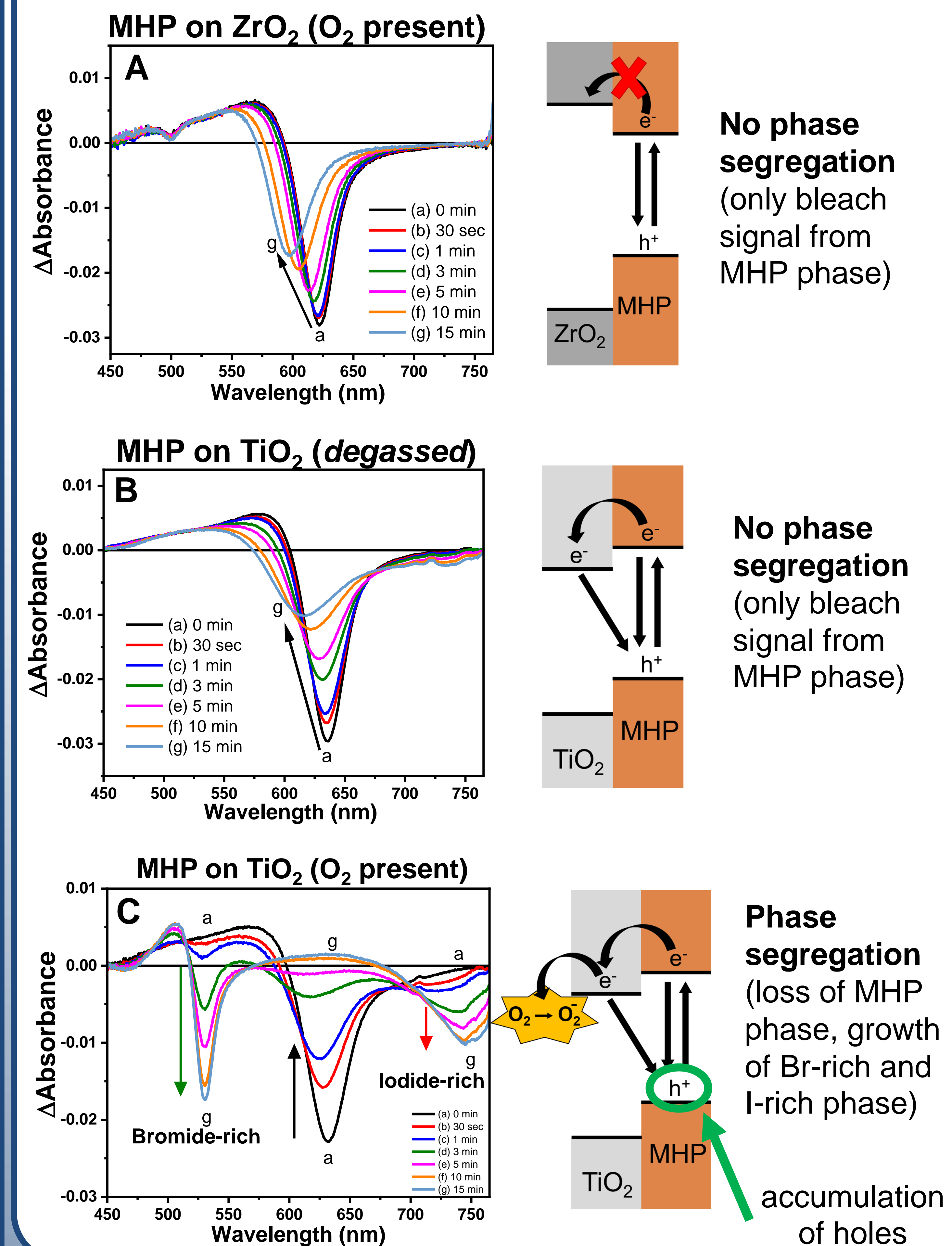
Conclusions:

- Phase segregation in MHPs occurred under conditions of **hole accumulation** (electrons extracted through O_2)
- Phase segregation was **suppressed** when **holes were extracted** thru addition of spiro-OMeTAD
- Balanced charge extraction crucial for MHP solar cells

Link to paper:

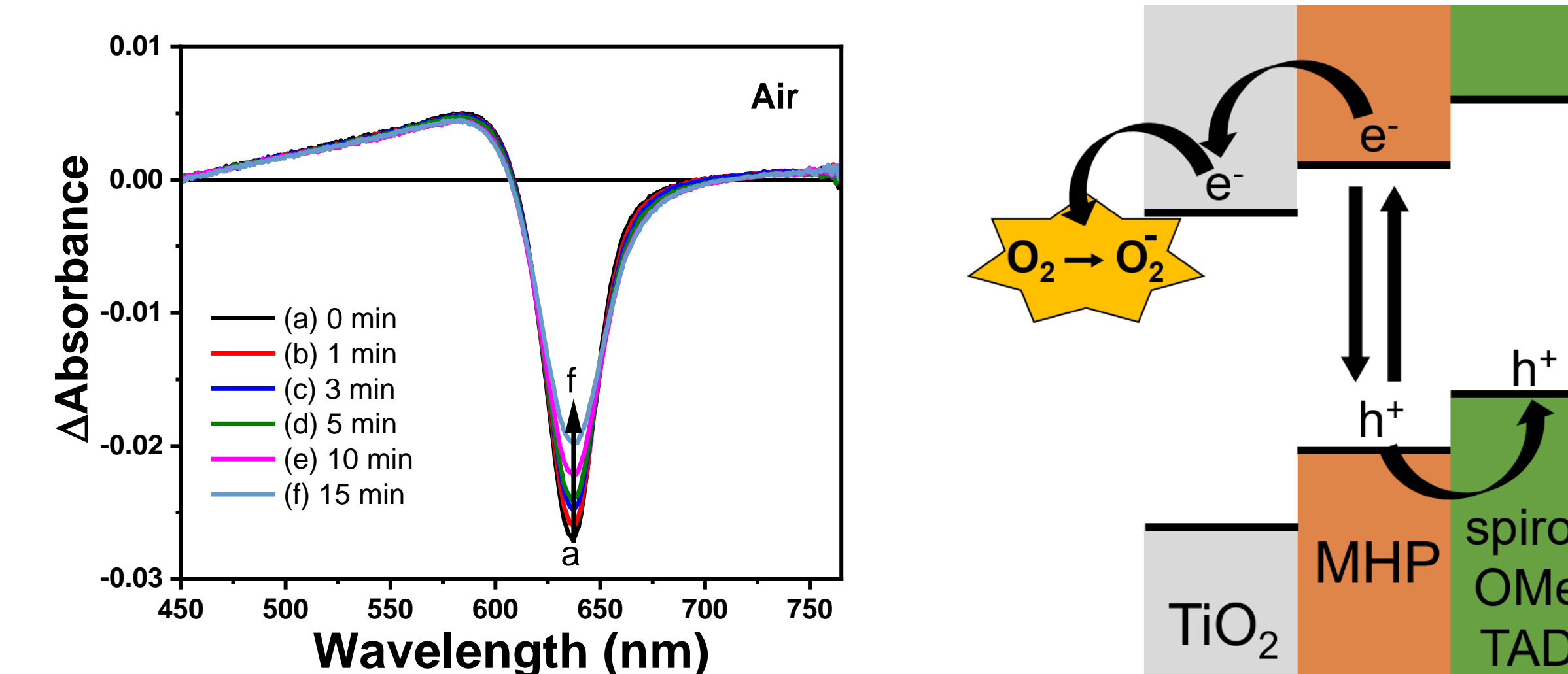


Results



Suppressing Hole Accumulation

Question: can we suppress phase segregation by extracting holes?



No phase segregation observed when **holes extracted** into spiro-OMeTAD layer

Acknowledgements

