



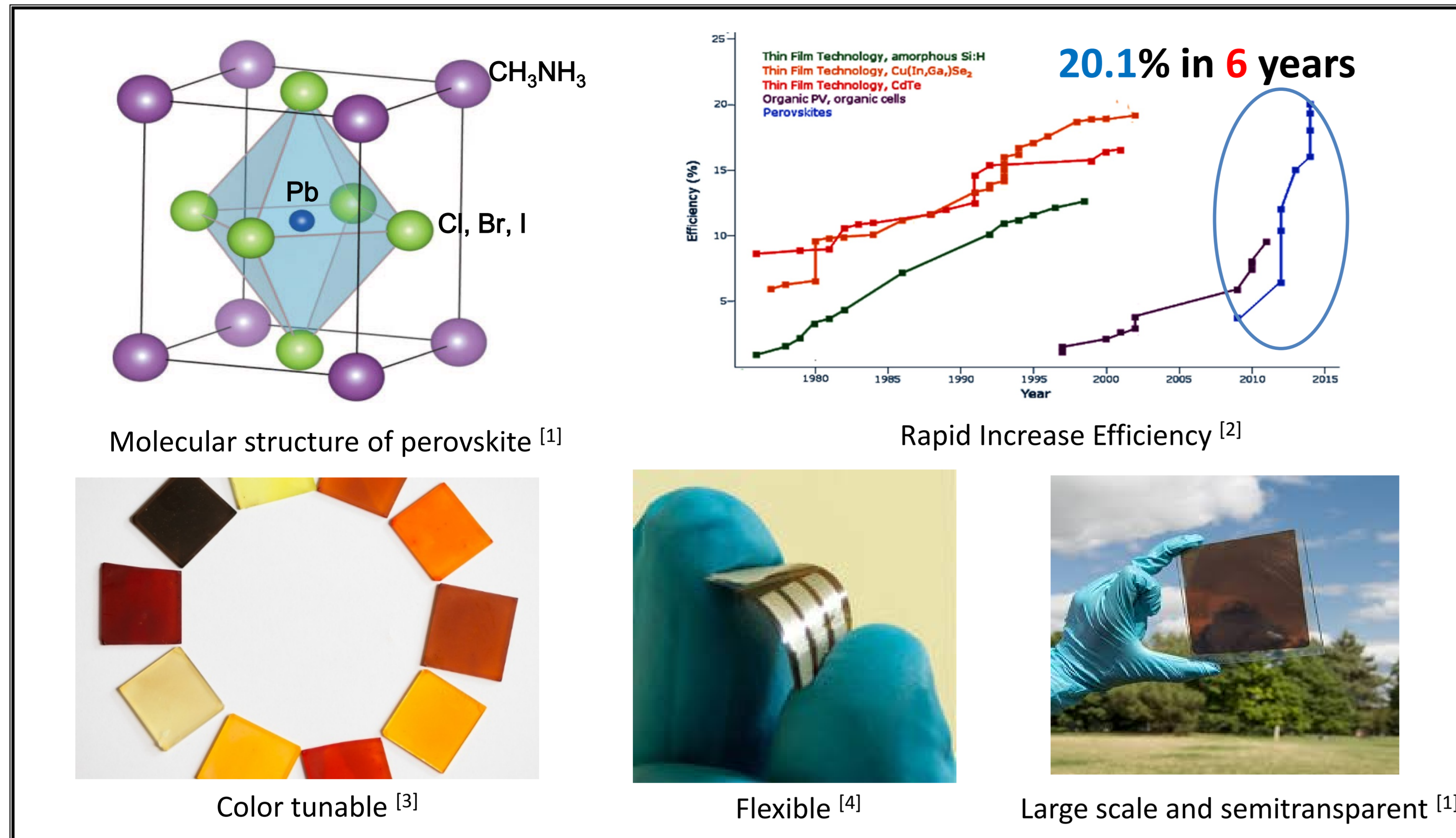
Doped Hole Transport Layer for Efficiency Enhancement in Planar Heterojunction Organolead Trihalide Perovskite Solar Cells

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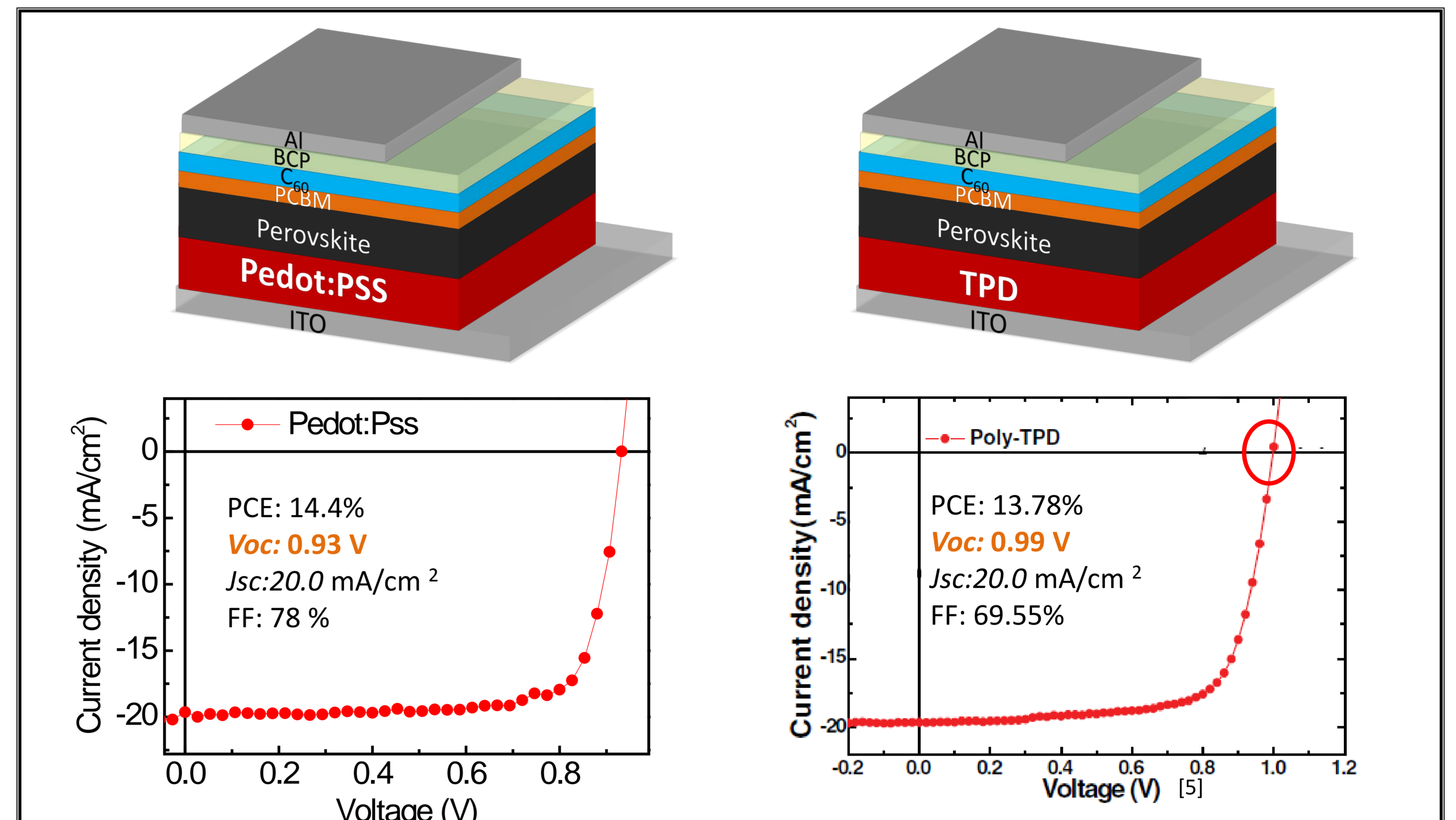
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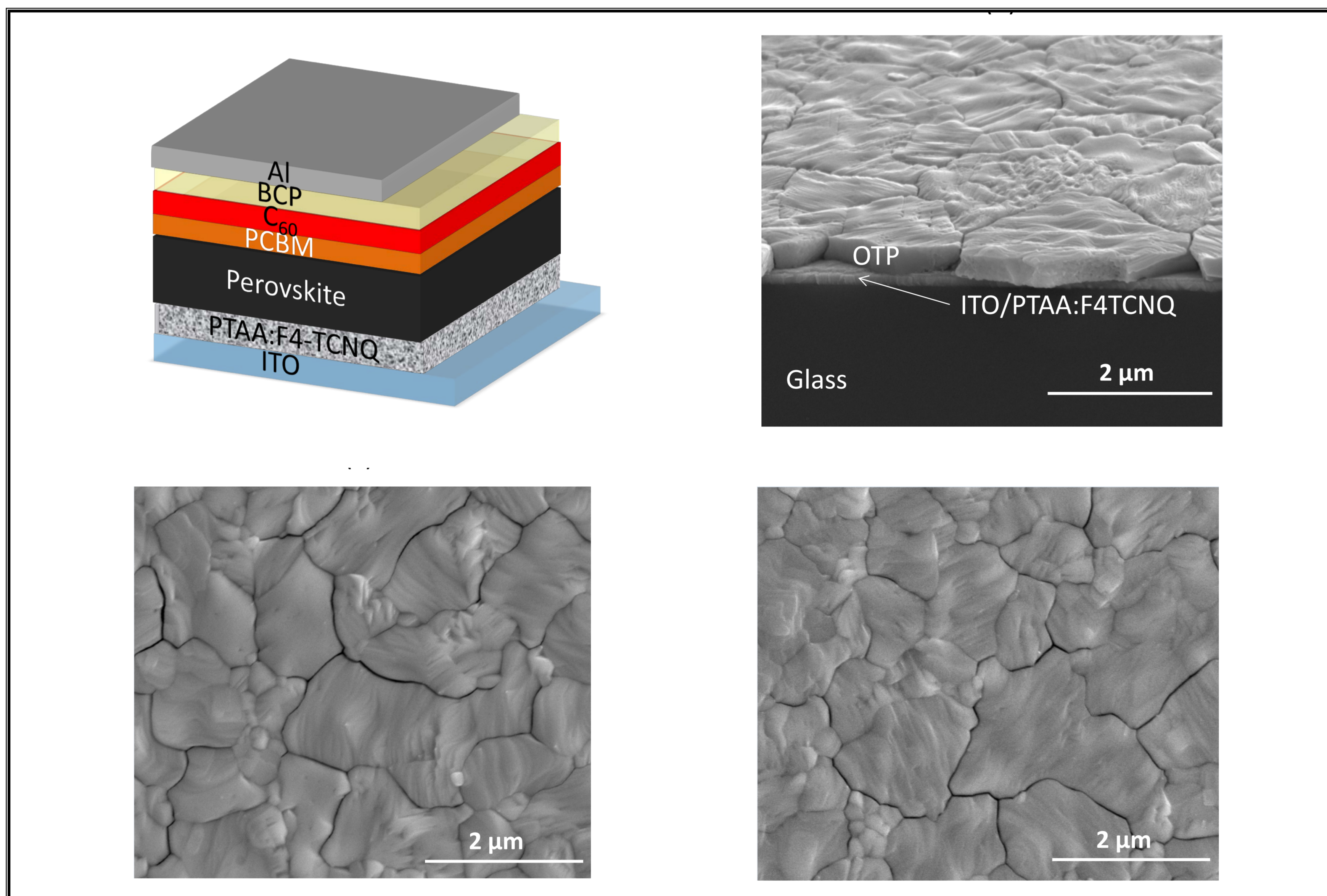
Research Motivation



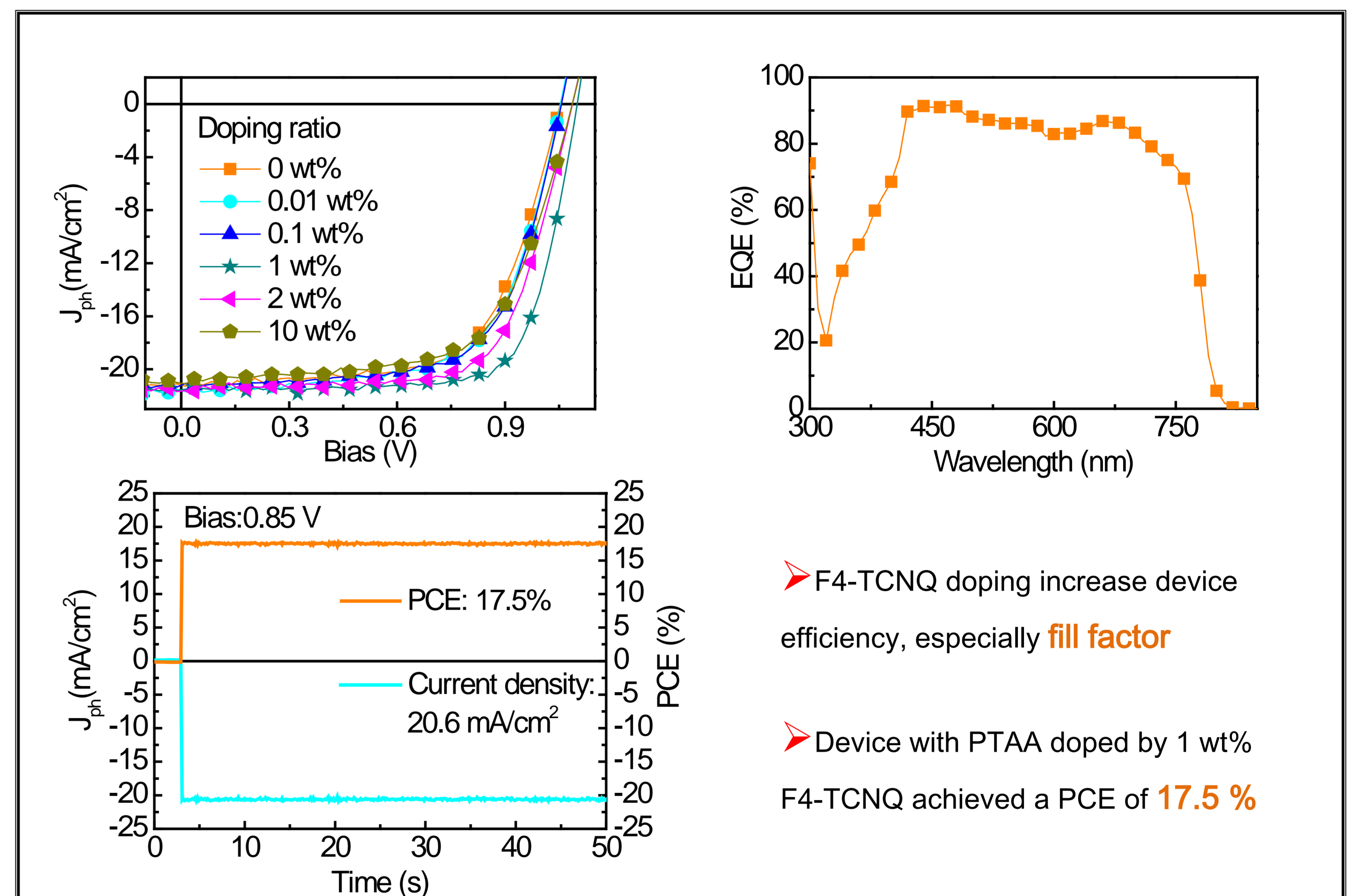
Hole Transport Layers



Device Structure and Film Morphology

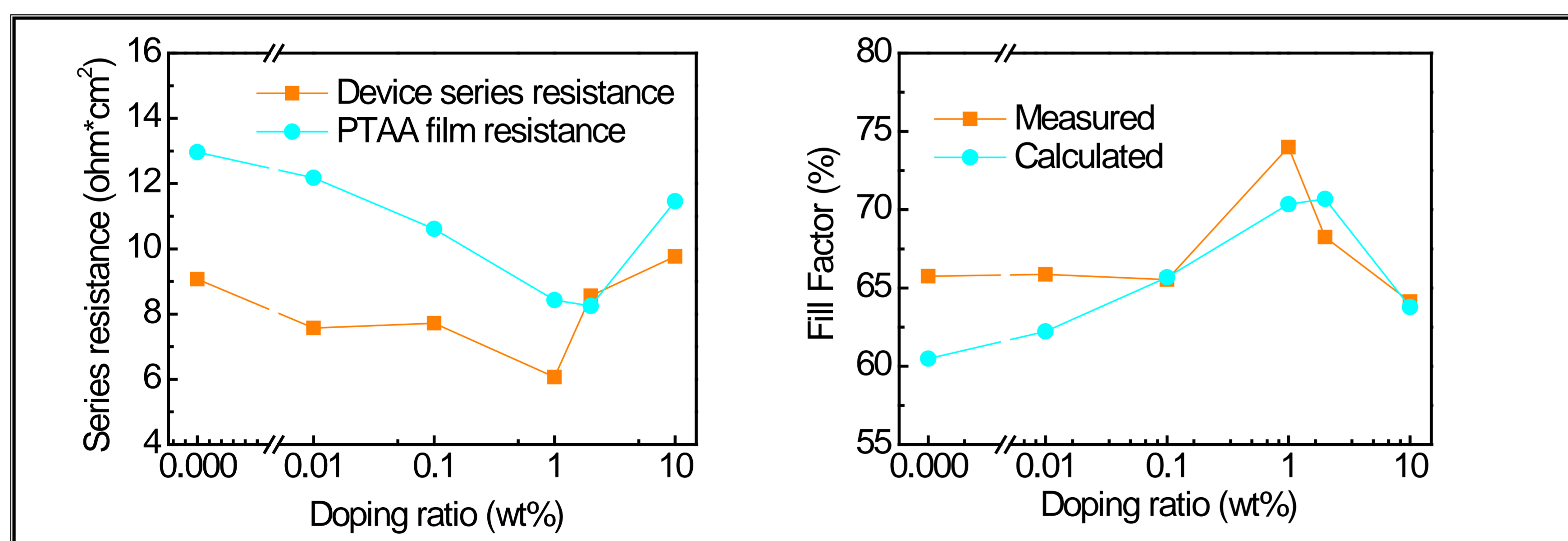


Performance optimization



- F4-TCNQ doping increase device efficiency, especially **fill factor**
- Device with PTAA doped by 1 wt% F4-TCNQ achieved a PCE of **17.5 %**

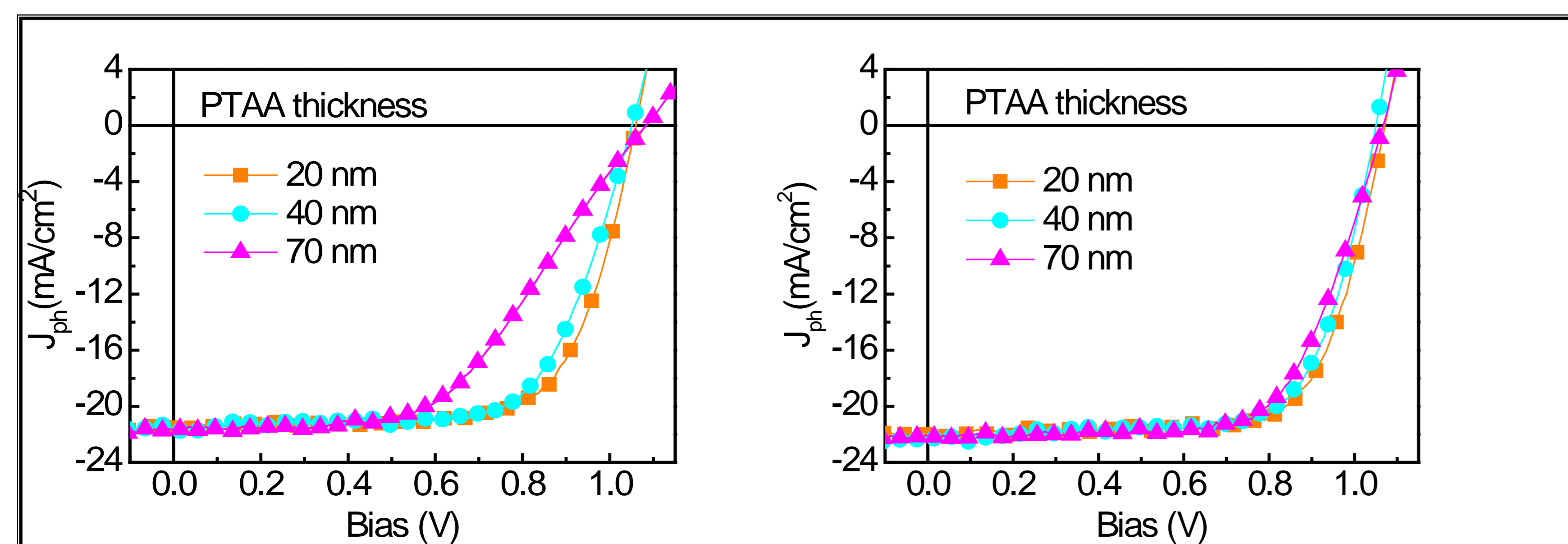
Increasing FF by Doping



Conclusions

- High device PCE of **17.5 %** was achieved by doping HTL
- Doping was found **increasing device FF** by reducing series resistance
- Pointing out **an new direction** of further increasing the efficiency above 20%

Thickness Dependence Performance



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