**Molecular Engineering of Hole Transporting Materials for Low Cost Highly Efficient and Stable Perovskite Solar Cells**

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The research on perovskite solar cells (PSCs) has gained a huge attention in scientific and industrial community mainly due to their ability to reach the performance close to that of the existing high performance silicon and other inorganic material based solar cell technologies. The world record power conversion efficiency (PCE) of PSCs has now exceeded 22%. The hole transport materials (HTM) is one of the most important and critical component of a PSC which prevents the active perovskite layer with the metal electrode, and blocks moisture and oxygen penetration, which leads to high stability. In addition to that HTM acts as a charge transporting as well as a charge selective layer, which also suppresses charge recombination and enhances higher PCE.

Among these various functional HTMs, in the small organic molecule category, 2,2’,7,7’-tetrakis(N,N’-di-pmethoxyphenylamino)-9,9’-spirbiuorene (SPIRO-OMeTAD) has been proven to be the best choice of materials as its use resulted in a world record 20.8% efficiency in PSCs.However, a very high cost of SPIRO-OMeTAD HTM restricts the development of low cost and large area flexible perovskite solar cells. Herein, we have designed and synthesized series of novel low cost HTMs based on linear π-conjugated linkers and TPA end-cappers which gives almost 17-20% PCE (champion 22.02% for un-doped HTM) using both standard mesoporous and inverted geometry with high stability. 1-9

**References**

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