**Tetrabutylammonium (TBA)-Doped Methylammonium lead iodide: high quality and stable perovskite thin films**

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**Supplementary Materials :**

 **Table 1 :** The parameters of the materials used for the simulation.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameters | Spiro MoTAD | MAPbI3 | TiO2 | FTO |
| Thickness ($um$) | 0.20 | 0.45 | 0.05 | 0.5 |
| Bandgap (eV) | 3.17 | **Variable** | 3.2 | 3.5 |
| Electron affinity (eV) | 2.05 | 3.93 | 3.9 | 4.0 |
| Dielectric Permittivity | 3.00 | 30 | 9.0 | 9.0 |
| CB Effective Density of States (1/cm3) | 2.2E+18 | 2.5 × 1020 | 2.0E+17 | 2.2E+18 |
| VB Effective Density of States (1/cm3) | 1.8E+19 | 2.5 × 1020 | 6.0E+17 | 1.8E+19 |
| Electron Thermal Velocity (cm/s) | 1.0E+7 | 1.0E+7 | 1.0E+7 | 1.0E+7 |
| Hole Thermal Velocity (cm/s) | 1.0E+7 | 1.0E+7 | 1.0E+7 | 1.0E+7 |
| Electron Mobility (cm²/Vs) | 2.0E-4 | 5.0E+1 | 1.00E+2 | 2.00E+1 |
| Hole Mobility (cm²/Vs) | 2.0E-4 | 5.0E+1 | 2.50E+1 | 1.00E+1 |
| Donor Density ND (1/cm3) | 0.0E+0 | 1.0E+18 | 1.0E+17 | 1.0E+17 |
| Acceptor Density NA (1/cm3) | 2.0E+19 | 1.0E+18 | 0.0E+0 | 0.0E+0 |