Coupled Ionic-Electronic Equivalent Circuit to Describe Asymmetric Rise and Decay of Photovoltage Profile in Perovskite Solar Cells

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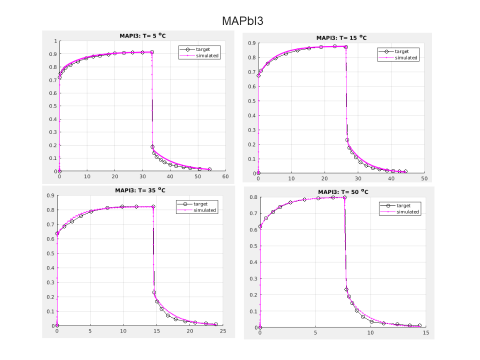
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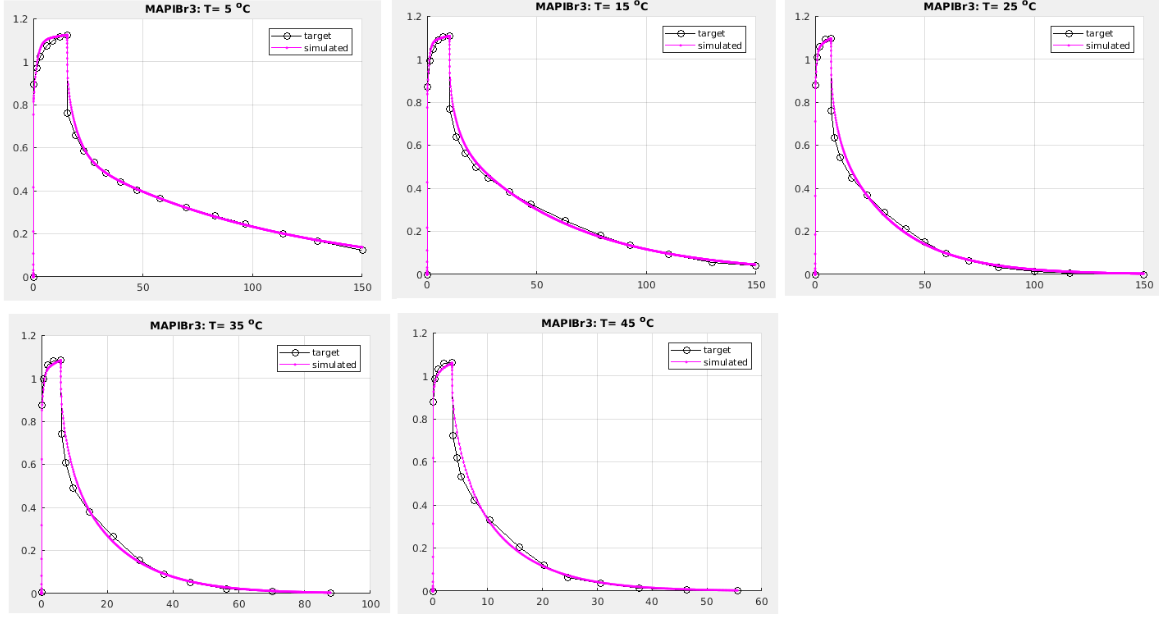
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**Table S1.**Photovoltage rise and decay parameters related to solar cells with different absorber materials. Information are extracted from the curves of Figure 2.

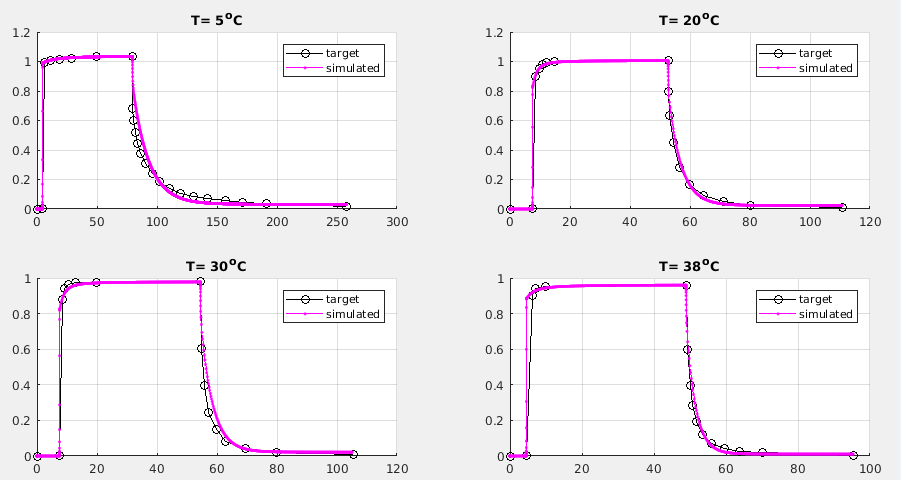
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Absorber*** | *Temperature (K)* | ***photovoltage rise*** | ***(VR1)****Initial Fast Voltage rise after 50 ms (mV)* | ***(r)*** *Time interval for full rise (S)* | ***(VR2)*** *Slow oltage rise (mV)* | ***Photovoltagedecay*** | ***VD1)****Initial Fast Voltage decay after 50 ms (mV)* | ***(d)*** *Time interval for full decay (S)* | ***VD2)****Slow voltage decay (mV)* |
| ***MAPbI*** | *278* | *709* | *30* | *199* | *722* | *16* | *196* |
| *283* | *698* | *24.5* | *197* | *656* | *13.1* | *214* |
| *288* | *664* | *23.9* | *206* | *652* | *12.1* | *193* |
| *298* | *655* | *19.3* | *198* | *630* | *8* | *197* |
| *308* | *637* | *14.1* | *184* | *593* | *5.4* | *201* |
| *316* | *620* | *8.5* | *189* | *586* | *6.8* | *195* |
| *323* | *617* | *6.5* | *176* | *563* | *4.2* | *202* |
|  | | | | | | | | | |
| ***MAPbBrI*** | *278* | ***photovoltage rise*** | *865* | *15* | *254* | ***Photovoltagedecay*** | *369* | *390* | *726* |
| *283* | *878* | *10.8* | *234* | *346* | *264* | *741* |
| *288* | *867* | *9.7* | *239* | *345* | *184* | *736* |
| *293* | *859* | *8.8* | *242* | *336* | *144* | *731* |
| *298* | *854* | *6.6* | *235* | *340* | *91* | *723* |
| *303* | *863* | *4.4* | *217* | *333* | *76* | *720* |
| *308* | *862* | *4* | *208* | *331* | *53* | *712* |
| *313* | *852* | *3.5* | *210* | *330* | *40* | *705* |
| *318* | *869* | *2.6* | *184* | *332* | *30* | *694* |
|  | | | | | | | | | |
| ***CsFAMAPbBrI*** | *276* | ***photovoltage rise*** | *870* | *103* | *255* | ***Photovoltagedecay*** | *272* | *353* | *829* |
| *283* | *885* | *94* | *242* | *266* | *250* | *837* |
| *289* | *887* | *78* | *235* | *247* | *200* | *850* |
| *293* | *880* | *50* | *220* | *277* | *134* | *798* |
| *298* | *885* | *42* | *222* | *262* | *109* | *819* |
| *303* | *889* | *32* | *212* | *247* | *92* | *823* |
| *308* | *869* | *24* | *224* | *221* | *68* | *845* |



Figures S1: Fitted curves for photo-voltage rise and decay profiles of MAPbI3 were fitted through the equivalent circuit of Figure 3a



**Figures S2: Fitted curves for photo-voltage rise and decay profiles of MAPb(I,Br)3 were fitted through the equivalent circuit of Figure 3a**



**Figures S2: Fitted curves for photo-voltage rise and decay profiles of CsFAMAPb(I,Br)3 were fitted through the equivalent circuit of Figure 3a**