**Estimation of parameters for solar cells with S–shaped current–voltage characteristics using meta–heuristic algorithms**

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| Fig.S1. Fitting results (lines) for the simulated current-voltage characteristic (symbols). The values *I*01= 1.6⋅10-6 mA, *n*1= 1.92, *R*p1 = 190 Ω, *I*02 = 0.16 mA, *n*2= 1.92, *R*p2 =190 Ω, *R*s = 45 Ω, *I*ph = 8 mA were assumed under simulation. | | |

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| Fig.S2. Fitting results (lines) for the simulated current-voltage characteristic (symbols). The parameters values from Sec.2.2.2 were assumed under simulation. | | |