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| Evaluation of iron contamination in silicon solar cells via photovoltaic parameters |
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| **Abstract:** | The installed photovoltaic (PV) systems are mainly based on p-type silicon solar cells (SSC), where iron is an omnipresent and efficiency-limiting impurity. Therefore, iron detection is an essential task. Conventional techniques require special equipment. Simultaneously iron is easily transformed between two metastable states, and such a transition affects SSC parameters, which are simply detected from current-voltage characteristics. We aimed to consider iron-induced PV parameter changes for impurity evaluation in SSC.  The SSC simulation was performed using SCAPS-1D software for a temperature range of 290-340 K. The AM1.5 or monochromatic light (940 nm) illumination conditions were used. The relative changes of short-circuit current (Isc), open-circuit voltage (Voc), efficiency (η), and fill factor (*FF*) were under consideration for SSC with various base depth (180-380 μm), dopant concentration NA (boron, 1015-1017 cm-3), and iron concentration NFe (1010-1014 cm-3). It was shown that Isc and η are most promising for iron evaluation because their changes rich up to 40-50% and monotonically depend on NFe; the change in Voc is about 10%, but an ambiguous relationship between εVoc and NFe is observed at low boron concentration; *FF* change is less 1% only at NA=1017 cm-3 and non-monotonically depend on NFe is received as well. |
| ***Keywords****:* | *silicon solar cell, iron concentration,* *photovoltaic parameters, SCAPS* |

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