

# PID-Factsheet

## Bosch Solar Energy AG

www.bosch-solarenergy.com



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### P = Potential, I = Induced, D = Degradation

Voltage-related or potential induced degradation refers to power loss in a module due to high voltage, high humidity and high temperatures. This phenomenon was first observed under laboratory conditions in the monocrystalline cells with front contacts used by Bosch Solar Energy in mid-2010, but has yet to be examined in Bosch modules in the field. If the aforementioned effects all occur in a module at the same time, the charge carriers (see Fig. 1, leakage current) may shift to the uppermost cell layer. This produces an electrical modification in the solar cell, which results in power loss in the cell and, consequently, in the module as well (see also Fig. 2). The higher the voltage, temperature and humidity are, the more leakage current paths are formed, and the greater the power losses are.

Bosch Solar Energy has quickly assembled a team of experts to study this phenomenon from a cell, module and system perspective. A test rig has been set up under laboratory conditions and is used to simulate and investigate the PID effect on different module designs and different components. Several experiments have already been conducted on this test rig under laboratory test conditions to study the PID effect and its potential causes (see Fig. 3: electroluminescent images of cells with/without PID effect). Further tests are intended in order to determine well-defined test conditions, since a standardized test procedure has not yet been established.

Fig. 1

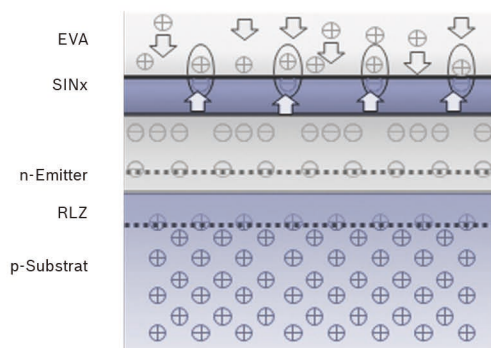


Fig. 2

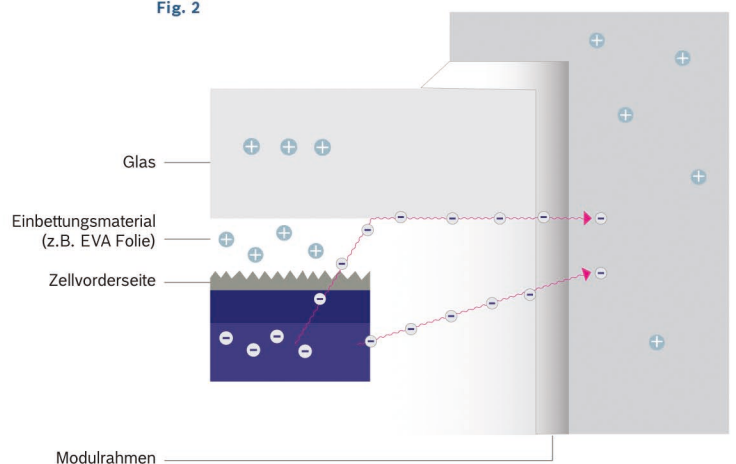


Fig. 3