HZB Helmholtz Zentrum Berlin

HZB TECHNOLOGY TRANSFER PRIZE 2021

SPV spectrometer

for SPV (surface photovoltage) spectroscopy over wide ranges
in time (dc…ac…transient) and photon energy (NIR…VIS…DUV)

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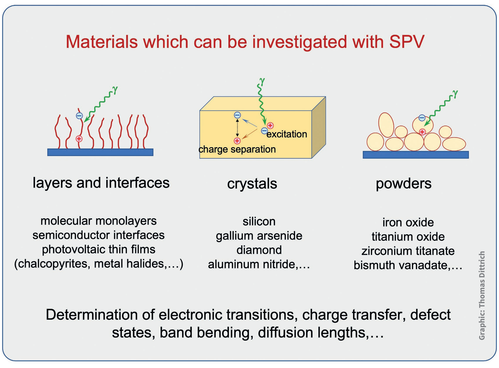
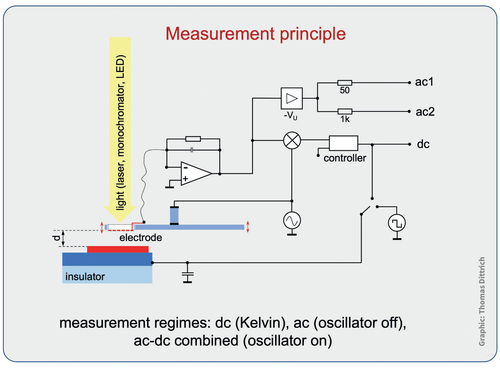


Variability of photoactive materials, sample configurations, properties and processes which can be investigated with SPV-spectrometers.



Scheme of a complex SPV-spectrometer for dc, ac and ac-dc combined measurements (without optical systems and measurements devices).

INNOVATION

The investigation, development and routine control of photoactive materials and interfaces, for example in the areas of photovoltaics, photocatalysis and electronics, demand fast, user friendly, highly sensitive and contactless measurement techniques.

The conventional characterization of photoelectric properties often faces challenges related to the preparation of contacts, spectral bandwidth and available ranges of time or frequency. SPV techniques provide excellent conditions for getting innovative solutions of related problems. However, corresponding SPV-spectrometers are not commercially available yet.

In the beginning of 2021, the HZB granted a patent enabling the contactless measurement of electrical potentials over very wide time domains (nanoseconds to dc). The main idea of the patent is based on the realization of ac and dc as well as combined ac-dc measurements with the identical electrode configuration.

First results on the research of semiconductors with extremely wide bandgap, which were obtained with the patented technique, have been published very recently (Surface photovoltage spectroscopy over wide time domains for semiconductors with ultrawide bandgap: example of gallium oxide, Dittrich et al., Phys. Stat. Sol. A, 2021, 2100167).

On the basis of the ideas patented and tested at the HZB and on the long-standing experience in the field of SPV, a compact SPV-spectrometer for broad applications in industry and research is under development together with the partner in industry Freiberg Instruments (FI) and the partner at the Helmholtz-Zentrum (HZ) Hereon.

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

aufgrund eines Beschlusses des Deutschen Bundestages

ZIM Zentrales Innovationsprogramm Mittelstand

Patent / market / partners in industry

1. Patent: M. Franke, Th. Dittrich, WO 2021/000998 A1, DE10 2019 117 989 B3
2. Diverse markets in R&D as well as in quality control (semiconductors, materials with extremely large band gap, photovoltaics, photocatalysis …)
3. Partner in industry: Freiberg Instruments, joint ZIM-project