Berne specific energy storage applications

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The SIP Biel/Bienne, which is home to the Energy Storage Research Centre and other innovative companies, is the perfect partner for implementing research outcomes into practice. SIP Biel/Bienne is one of the five locations selected for the national Switzerland Innovation project.

Bern University of Applied Sciences’ engagement with the Swiss Competence Centers for Energy Research (SCCER) ‘Storage’, ‘Mobility’ and ‘Grids’ brings substantial benefits to the centre. This collaboration ensures access to key national and international research networks in energy storage and its applications, which is particularly advantageous for external partners of the Energy Storage Research Centre.

The Lithium-Ion Battery Competence Network (KLiB) counts among its members leading international industrial companies and practice-oriented research institutes. The competence network focuses on all topics relating to lithium-ion batteries. To facilitate knowledge transfer and cultivate international contacts, the Energy Storage Research Centre joined the KLiB in spring 2017.

The collaboration between the Institute of Dongguan at Sun Yat-sen University (SYSU) in China and the Energy Storage Research Centre focuses on co-developing a hardware-in-the-loop BMS tester, located at the BFH Centre. The BMS-HIL testing and development platform tackles the challenges most commonly encountered when designing a BMS for the automobile and energy storage industry. This collaboration offers insights into the demands placed on BMS technology at an industrial level.

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Flexible electronics have produced a paradigm shift in the wearable technology sector1,2,3. Remarkable advancements were made in developing wearable sensors that are thin, conformal, and stretchable4,5,6. In particular, ultraflexible devices have garnered immense attention due to their ability to seamlessly integrate with the human skin7,8,9,10,11, providing more accurate data acquisition and an enhanced degree of user comfort.

Advances in wearable technology are highly dependent on the development of flexible energy devices, which should offer high efficiency, durability, and constant power output and possess the capacity for effortless integration12,13. Most commercial wearables rely on bulky coin cells or rechargeable batteries as power sources. These contribute significantly to the system"s overall rigidity, posing limitations to their mechanical compliance and often necessitating frequent charging or replacement.

The performance of OPV devices is highly dependent on the exciton dissociation and charge recombination processes40. To probe the charge recombination in the OPVs, we evaluated the light intensity dependence of JSC and VOC. The ideality factor (n) of photovoltaics, which indicates the measure of how closely they follow the ideal diode equation41, can be derived from the dependence of VOC on incident light intensity following:

where kB is for the Boltzmann''s constant, T is temperature, q is elementary charge, and I stands for light intensity. The ideality factor was estimated as 1.30 for PM6:Y6 binary-blend OPVs and 1.22 for PM6:O-IDTBR:Y6 ternary-blend OPVs, as shown in Fig. 2D. The ideality factor, observed to be closer to 2 in this binary case, suggests that the dominant carrier loss mechanism is trap-assisted recombination. JSC depends on the illumination intensity following the power law,