Perovskite solar cells on flexible substrates: up-scaling and applications

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Perovskite solar cells (PSCs) have emerged as the fastest-advancing photovoltaic technology in the last decade, thanks to its outstanding power conversion efficiencies - up to 25.2% on glass[1], 19.5% on flexible substrates[2] – and low-cost solution-based manufacture.
Flexible PSCs exhibit a lower embedded energy than rigid glass cells, are light-weight, conformable and thus ideal for seamless integration of PV onto consumer electronics or building-integrated systems, i.e. PV windows, roof tiles and textiles.
The up-scaling of flexible PSCs imposes stringent limits in terms of choice of materials and processing methods: we present an overview of our research journey so far in this direction, that has led to flexible modules with an active area of 15 to 20 cm^2 and over 10% efficiency.

1. National Renewable Energy Laboratory (NREL). *Best Research-Cell Efficiency Chart, Photovoltaic Research* https://www.nrel.gov/pv/cell-efficiency.html (2019), accessed on 2020-08-03.
2. Huang, K. *et al.* High-Performance Flexible Perovskite Solar Cells via Precise Control of Electron Transport Layer. *Adv. Energy Mater.* **9**, 1901419 (2019).