Solar cells with one-day energy payback for the factories of the future

Scalability is a requirement before any new energy source can be expected to house a possible solution to the challenge that mankind’s increasing energy demand presents. No renewable energy source is as abundant as the Sun and yet efficient and low-cost conversion of solar energy still has not been developed. We approach the challenge by firstly taking a technology that efficiently addresses the need for daily production of 1 GWp on a global level, which does not employ elements with critically low abundance and has a low thermal budget. We then applied life cycle assessment methodologies to direct research and developed such technology in the form of a polymer solar cell that presents a significant improvement in energy payback time (EPBT) and found that very short energy payback times on the order of one day are possible, thus potentially presenting a solution to the current energy gap of >14 TW by year 2050.