

## Transformation of today's energy systems towards sustainability – challenges for material science

Joachim Luther

Solar Energy Research Institute of Singapore

The transformation of the global energy system towards sustainability is high on the political agenda. Compared to today's energy supply, which is mainly based on fossil fuels, a sustainable system would combine, amongst others, the following advantages: (i) protection of the natural life support system, (ii) reduction of the dependence on locally concentrated energy sources and (iii) reduction of energy poverty in developing countries.

The transformation of the current energy supply is technologically and economically feasible. Most likely, a future-compliant energy supply will primarily be based on the efficient use of energy and the (sustainable) use of renewable energy sources.

Innovations in material science will play a decisive role in this transformation process. Main focus areas will be (i) energy efficiency, (ii) use of renewable energy resources, (iii) smart electricity grids and power transmission, (iv) energy storage and (v) smart electric loads like electromobility systems.