

NANOSTRUCTURED OXIDE THIN FILMS FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

These days, mankind has been starting to face many difficult issues: energy problems, environmental problems, water problems and so on. It is a common feeling that new advanced materials will play an important role in the current challenge to develop alternative and sustainable energy technologies to reduce our dependence on nuclear and fossil fuels and eliminate greenhouse gas emissions.

In particular, superconducting and thermoelectric materials seem fitted to solve the energy puzzle since they can provide efficient energy transport and conversion, respectively. Amazingly, superconductors can transport electrical current without dispersion if cooled down at the appropriate temperature. Superconducting bulks and single crystals are quite important for the study of the basic physical properties, however for practical applications, like direct current transportation or winding of magnets, development of superconducting wires and tapes is strongly required. Thermoelectrics can convert heat into electrical energy. Efficient, small and light thermoelectric modules are fundamental to recycle waste heat from industrial plant, cars, or even domestic stoves.

This paper will highlight the recent development of highly oriented nanostructured films of superconducting and thermoelectric oxides with strongly enhanced properties for sustainable energy applications.