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Editorial

Foreword: materials for energy harvesting, conversion and storage (ICOME 2017)

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The close relationship between concepts of materials and energy reveals the power that can change personal habits, societal behavior and human balance. The continuously looping interaction between energy and materials exerts influences on all civilizations and at all scales of the society, from Babylonia, Greece, Persia and China to the global world fueled by the prosperity of sciences, mathematics and technology.

In particular, scientific ideas and the technological implementation of the principles of nature, understood and mastered since antiquity with water and fire, until present days with nuclear power and its material support, have molded our interaction with the environment. Based on the power of mathematics, the strength of physics and its ties with other disciplines stimulates scientific research in the field of materials for energy and the necessary progress in the efficiency and limits of energy resources in regard to the demand increase.

In that respect, this EPJAP special issue on 'Materials for energy harvesting, conversion and storage' allows to sketch the actual coupling between researches on materials and energy. It is based on selected articles from the International Conference on Materials and Energy held in Tenjin, China in 2017.

The present special edition is a continuation of the series [1,2]. It represents a snapshot of some advances at the material–energy interface. It is also a forum to highlight selected young researcher's research, as well as to stimulate the interest of new coming young researchers into the multidisciplinary challenge that is to resolve the new problems and answer the open questions at the border of their own discipline.

The physics of materials for energy harvesting, conversion and storage must cover nanoscale and thin-film properties and processes [3–16] as well as their thermal properties [17,18]. It also covers heat and mass transfer enhancements in a system [19–29], renewable and energy efficient materials [30–33] including large scale as building-integrated photovoltaic (BIPV) panels. In the intermediate scale, we have the solar collectors and storage coupled systems [34,35] to complete the overview.

This issue contains a selection of articles highlighting the coupling between theoretical methods and experimental approaches to achieve energy efficiency. Future developments in this field may soon require an extended vision of physics, incorporating bio, nano and quantum sciences as a multiscale engineering problem.

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