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## 15th European Conference on Thermoelectrics Foreword

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ECT\_2017

## Foreword

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The European Conference on Thermoelectricity (ECT) celebrated this year its 15th meeting. Since its first instance, held in Cardiff in 1987 under the direction of Professor Rowe, the road ECT has walked through has been long and, we may surely say, very successful. Compared to the thirty-five papers of ECT 1987, the attendance to ECT has not only incredibly grown over the years, but has also widely diversified, attracting scientists not only from Europe but also – and in substantial number – from Asia and America, becoming one of the key events for the overall thermoelectric community worldwide. At the same time, research on thermoelectricity has substantially expanded, as well known, moving from 109 papers published in 1987 to more than 2,300 articles appeared in 2017. No doubt about, thermoelectricity is nowadays a hot research topic, attracting young brilliant minds from all countries and fascinating experienced senior researchers who are entering this field from the most diverse backgrounds.

Thermoelectricity is not only academic material research, however, and this has come especially clear over the last decade. Along with an outstanding number of novel classes of materials with high thermoelectric performances, the thermoelectric community has seen the concurrent growth of new companies, often spin-offs and start-ups, focusing their business on the development of thermoelectric generators and coolers that meet the requests of a rapidly developing market. From macroharvesting, mostly aimed at automotive and at energy-intensive industries, to microharvesting, powering the expanding IoT universe, thermoelectricity is qualifying as a major opportunity both to recover low-enthalpy heat and to support technologies requiring small but critical renewable power sources to operate. In this sense, thermoelectric R&D is complementing technologies such as photovoltaics and wind power generation toward a decarbonized economy, at the same time acting as an emerging key enabling technology for a connected society.

The progress of thermoelectricity still has hurdles to overcome, however. The visibility of the opportunities disclosed by the scientific and technological advancements in this field is surely still insufficient, as well as support to research. Undeniably, further to its use to power probes for deep-space exploration, thermoelectricity still lacks an application context where its use is non-renounceable. Material efficiency is part of the problem, manifestly enough, despite the gigantic steps forward of the last few years. Cost factors for thermoelectric generation and cooling is another well-known limiting issue. But it is probably the coexistence of these two parallel issues to show the path that our community should go through to bring thermoelectricity to its full maturity – scientific and technologic. ECT 2017, as all previous European and International conferences on thermoelectricity, was the occasion for device technologists and material scientists to meet up and to share ideas and needs. Very few areas of materials research see such a systematic and continual exchange of viewpoints between professionals working on applications and scientists dealing with material issues. A truly promising mix of viewpoints, which has already readdressed basic research toward highly performing materials that, also in view of their economic and environmental compatibility, may be rapidly deployed in actual devices and modules; and that, at the same time, has made technologists immediately aware of the new opportunities that non-traditional materials may offer.

The Proceedings of ECT 2017 we publish in this special issue of *Materials Today Proceedings* properly witness the rich variety of competences and approaches to thermoelectricity. Papers range from theory to application, from materials issues to device manufacturing. And, in many cases, it is evident how technological and market demand drive and guide basic research. A perfect blend of know-hows and sensitivities that confirm the lively and crossdisciplinary identity of this branch of science.