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**Peter Bermel
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Introduction

The inaugural symposium for *Thermal Radiation Management for Energy Applications* sought to capture the diverse roles that thermal radiation can play in many sustainable energy systems. In this context, achieving control over thermal radiation offers many novel phenomena, such as enhancing or suppressing emission through novel physical mechanisms at selected wavelengths, angles, or polarizations. Recent developments in material science, nanophotonics, plasmonics, and metasurfaces have made this a uniquely promising time to develop new understanding and capabilities in this direction. These new capabilities can then find clear applications across a range of fields.

The primary areas covered in this year's symposium were selective solar thermal absorbers; high-temperature metamaterials; radiative cooling; and novel applications for thermal radiation.

Selective solar thermal absorbers allow for one to capture sunlight while minimizing thermal re-radiation, improving the operating temperature and the overall conversion efficiency of solar thermal devices. Particular highlights include generalized theory of selective solar absorber design (Shen et al.) and solar absorbers for steam generation and water purification (Jia Zhu et al.).

High-temperature metamaterials have value in terms of creating more efficient and selective infrared sources, which can be used by themselves or coupled with thermophotovoltaics to generate electric power from heat. Novel work presented used graphene as the basis for selective thermal emission using gap plasmon modes with voltage tuning (Kate Fountaine et al.), as well as in combination with epsilon-near-zero materials (Zubin Jacob et al.)

Another key area requiring careful control of thermal radiation is radiative cooling, whether for terrestrial or space-based applications. Radiative cooling allows both for daytime passive cooling above and beyond standard convective processes, as well as below-ambient cooling for night time power generation. Significant work presented showed a mass-manufacturable path for radiative coolers based on nanostructured polymers (Xiaobo Yin et al.), as well as paints (Marc Gali et al.) and 3D-printed structures (A. Gentle et al.).

Finally, novel applications for thermal radiation were covered, which included more efficient incandescent lighting (Leroy et al.), thermoradiative conversion of heat to electricity (Bingnan Wang et al.), and 24%-efficient thermophotovoltaics (Woolf et al.).

In summary, this inaugural symposium on achieving control over thermal radiation explored several multi-faceted, multidisciplinary problems that impact both basic

science and practical applications. This effort has set the stage for exploring the role of additional novel materials with even higher potential performance at both near-ambient and highly-elevated temperatures, as well as developing further connection and scaling of these techniques to use in practical applications.

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