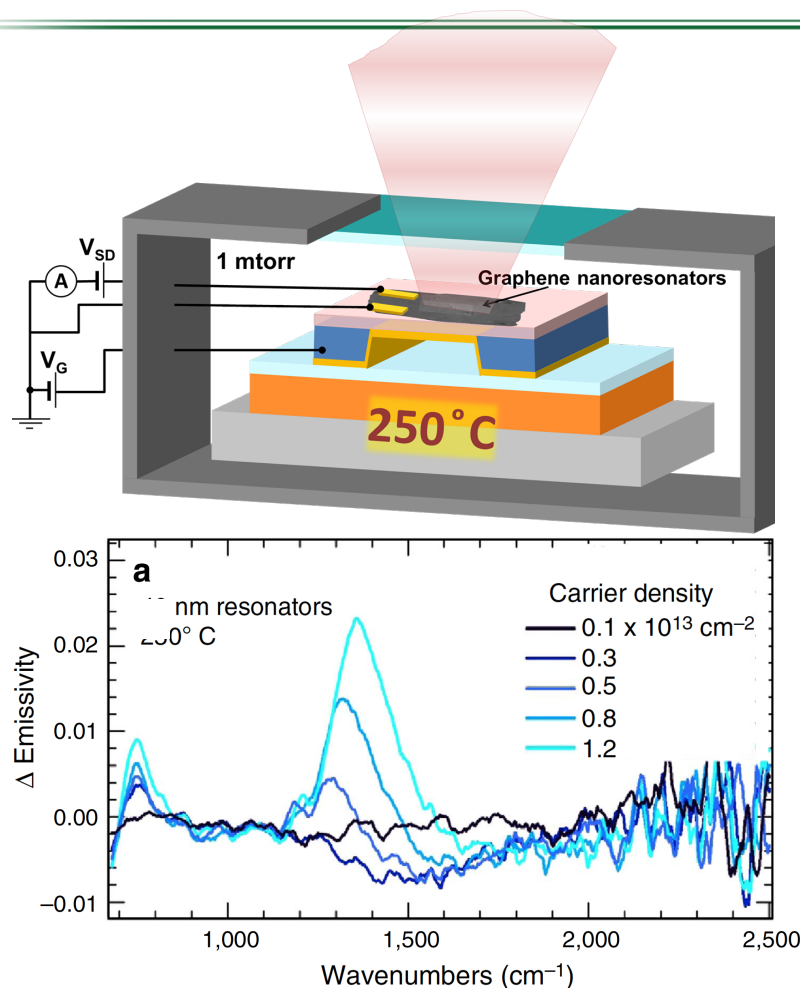


Controlling Thermal Emission with Graphene Metasurfaces



Top: Schematic of Graphene/SiN_x device and measurement apparatus; Bottom: Carrier density dependence of thermal spectrum from device at 250 deg. C

Work was performed at Caltech

Scientific Achievement

We electronically control the thermal spectrum of a hot surface by coating with a nanostructured graphene layer and varying the carrier density of the graphene sheet.

Significance and Impact

Modifying the power and spectrum of thermal radiation without varying the temperature of the surface provides a novel means of thermal management and low cost pathway to create fast, narrowband Mid-IR sources.

Research Details

- The polarization of the thermal radiation could also be controlled by changing the geometry of the graphene nanostructures.
- 2 kHz modulation speeds were demonstrated - an order of magnitude faster than conventional thermal sources.

V.W. Brar, M. Sherrott, M.S. Jang, S. Kim, L. Kim, M. Choi, L. Sweatlock and H.A. Atwater, *Nature Communications* **6**, 7032 (2015)