Towards active surface cooling using graphene metasurfaces

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The harnessing of graphene's properties on silicon wafers can open a broad range of miniaturized and reconfigurable functionalities to complement CMOS technologies with the smallest form-factor.
Despite inherent growth challenges, over the last decade we have shown that an epitaxial graphene on silicon carbide on silicon technology can unlock uniquely beneficial wafer - scale fabrication capabilities that are unmatched by transfer methods [1,2] and functionalities for MEMS/NEMS, nano-optics and metasurfaces, specifically thanks to the combination of graphene with silicon carbide [1, 3, 4].
This platform allows to realize any complex 3D graphene- coated carbide micropattern in a site – selective fashion, at the wafer -scale and with sufficient adhesion for subsequent integration. We explore the use of such capability to fabricate metasurfaces with highly efficient MIR light absorption tailored to achieve near-unity, spectrally coherent, thermal emitters [5]. As their narrowband emission lies within the sky window of the atmosphere, they promote thermal cooling.

References

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