Probing heat response in 2D materials by opto-thermal Raman method

Priyank Singh[1]
Suman Sarkar[1], Kyung Yeol Ma[2], David Jegouso[1], Corinne Felix[1], Pierre Bouvier[1], Marie-Aude Méasson[1], Pierre Rodière[1], Michele Lazzeri[3], Laëtitia Marty[1], Nedjma Bendiab[1]

[1]*Univ. Grenoble Alpes, CNRS, Institut Néel, 38000 Grenoble, France*
[2]*Ulsan National Institute of Science and Technology (UNIST), UNIST-gil 50, Ulsan 44919, Republic of Korea*
[3]*Sorbonne Université, MNHN, UMR CNRS 7590, IRD, IMPMC, Paris, France*
priyanksingh33@gmail.com

Abstract

Heat transport in 2D materials gives us the opportunity to explore new physics; the Fourier law of heat transport seems to be no more applicable in such systems due to extremely low thickness[1]. 2D materials (Graphene, TMDCs, hBN) become a challenging platform due to the fact that phonons can interact with different particles such as electrons, excitons and substrate etc. These interactions cause new observation for thermal response. There are some reports in literature for suspended cases [2][3] but often the devices made out of these materials require a supporting substrate[4]. In this work, we investigated to explore heat response of different 2D materials, exfoliated on a standard Si/SiO_2 substrate, using the optothermal Raman response. The chosen materials range from wide bandgap semiconductors to metals. We will discuss the the effect of electronic properties on our experimentally observed thermal response.

References

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