

# Thermoelectricity in liquid phase exfoliated van der Waals heterostructures

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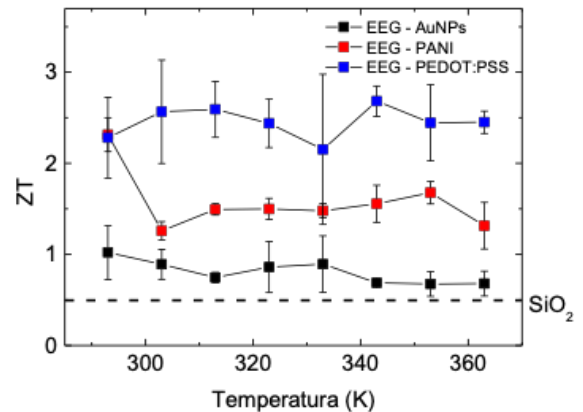
## Abstract

In recent years thermoelectrics have seen a boost in the reported figures of merit (ZT) due to the nanostructuring of traditional semiconducting materials [1]. This approach is yet to be brought to the point of using truly low dimensional materials with improved Seebeck coefficients and dimensions where thermal phonons are blocked [2]. Our group demonstrated that graphene – conducting polymer layered structures possess thermoelectric figures of merit up to 2.4 near room temperature [3]. This is in stark contrast with the reports for BiTe within the same temperature range. Heterostructures based on two dimensional materials have been predicted to have ZTs up to 2 at room temperature [4]. Here I will show recent results from our group on the ZT measurement of MoS<sub>2</sub> – graphene Van der Waals stacks prepared from liquid – phase exfoliated materials.

## References

- [1] JF Li, WS Liu, LD Zhao and M Zhou Nature Asia Materials, 2(4), 152, 2010.
- [2] M.S. Dresselhaus, et. al., Advanced Materials 19, 1043, 2007
- [3] D. Olaya et. al., 2D Materials, 5, 011004, 2018.
- [4] Hatfe et. al., 2D Materials, 4, 015012, 2017.

## Figures



**Figure 1:** Thermoelectric figure of merit (ZT) of graphene - conducting polymer layered structures measured using transient Harman method [3].