

## DYNASTY

## DYNAmics and STructural anaLYsis of 2D materials

**IESL SEMINAR**  
**Tuesday 10/10/2023, 11:00**  
**FORTH Seminar Room 1**

**STEM advanced characterization of  
2D materials: beyond graphene**

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**Abstract:**

In this seminar, I will talk about advanced electron microscopy characterization of 2D materials. I will start by making an introduction to TEM and STEM as well as 2D. In a second part I will review what has been done on graphene with imaging (determination of the number of layers, moiré patterns, defects and impurities. I will finish by introducing 4D-STEM and recent developments in our about mapping the orientations of graphene with the SEM.[1] I will then introduce spectroscopies (EDX and EELS) and their use in graphene characterization.[2] The lecture will continue focus on Transition metal dichalcogenides (TMD) focusing on MoS<sub>2</sub> and WS<sub>2</sub> and the determination of the stacking [3-4]. I will then talk about exfoliated perovskites and their use [5]. To finish I will report some recent work on Black Phosphorus (BP) [6] and the more exotic charge density wave (CDW) materials rare-earth chalcogenides.[7].

- [1] A. Orekhov et al., <https://doi.org/10.48550/arXiv.2011.01875>
- [2] S.Stambula et al., *J Phys. Chem. C* , 118, 8, 3890–3900 (2014)
- [3] S. Psilodimitrakopoulos et al. *npj2D Materials and Applications*, 5, 77 (2021)
- [4] A. Nalin Mehta et al., *Nanotechnology* 31 (44), 445702 (2020)
- [5] T.P.P. Le, et al., *Adv. Funct. Materials* 30 (1), 1900028 (2020)
- [6] H.C. Nerl et al., *Adv. Funct. Mater.* 29 (37), 1903120 (2019)
- [7] A. Achari et al., *Nano Letters* 22 (15), 6268-6275 (2022)

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