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A report “**The amazing meeting between polymer world and two-dimensional materials**” was presented by *Assoc. prof. Guilhermino José Macedo Fechine* from **Mack Graphe Centre, Mackenzie Presbyterian University, Sao Paulo, Brazil.**

### Summary

Since the isolation of graphene (two-dimension material, 2DM) from graphite by using micromechanical exfoliation, the world has been challenged to transform an academic discover into reality. Recently, the class of 2DM has been growing and new types of them are emerged, e.g. hBN, MoS<sub>2</sub>, MoSe<sub>2</sub>, WS<sub>2</sub>, TiS<sub>2</sub>, SnS<sub>2</sub>, and as graphene they also present singular properties in their two-dimensional crystalline structures. Graphene and others 2D materials can be produced mainly by micromechanical exfoliation (ME), Chemical Vapor Deposition (CVD), chemical exfoliation (CE) and liquid exfoliation (LE). Micromechanical exfoliation and CVD techniques need a process to transfer the 2DM's to the target substrates by using fast and non-destructive techniques. Some of these techniques will be present, including Micromechanical Exfoliation assisted by Polymeric Stamp and Direct Dry Transfer processes. For the other hand, chemical and liquid exfoliation processes produce 2DM's flakes dispersed in solutions and most of the cases they are used to prepare polymer nanocomposites. The strategies to insert these 2DM into the polymers have to be in the way to keep the exfoliated structure and avoid all kind of agglomerates of these nanoparticles on the polymer matrix. Two strategies developed by the Composite Materials Group of MackGraphe (Graphene and Nano-Material Research Center) will be explored during this presentation. Polymers are involved in all these propositions (transfer and nanocomposite manufacturing strategies) and the knowledge of the interaction between 2D material and polymer is very important for tuning the quality and quantity of the 2D material exfoliated or transferred as well as high performance polymer nanocomposites manufacturing.

### Discussion

**Prof. R. Kotsilkova** – Do you know that in Graphene Flagship a few companies work there and one of them, *Graphenea* from Spain, make this dry transfer of graphene but also for silica and polymers. Are they used your patent or not?

**Answer:** Probably. There are a lot of methods. This is the best one. It could be the best for that application. ... Samsung is already prepared a flexible device by using graphene, transferred to the polymer. I knew that 5 years ago when I was in Singapore.

**Prof. R. Kotsilkova** – Another question, tell us something about the pressing.

**Answer:** The pressure is very low, you could see the value in my paper. We control the temperature of the hot plate of the press. Of course, pressure is the key. Molecular weight of the polymer also matters.

**Question from the room** – May I ask about thickness?

**Answer:** That refers to a monolayer. The thickness is 0.4 nm.

**Question** – I wish to thank you for your presentation and congratulate you for the work, I wish to express thanks to prof. Kotsilkova that we have a pleasure to listen this talk, and my question is too technical, tell me something please about this micro-tomography and X-rays?

**Answer:** There is a Brazilian center that operates this facility and you can sent them some proposal and you can do some experiment there. They use X-ray beam and there are limits for thickness of the samples, 1-2 mm. A test takes 3-4 hours.

**R. Kotsilkova** – We use a tomography equipment that is in number 2 building.

**Assoc. Prof. G. Fechine** – Do you know what is the sensibility?

**R. Kotsilkova** – It's about 100 nm.

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