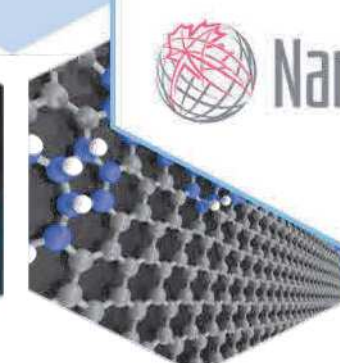
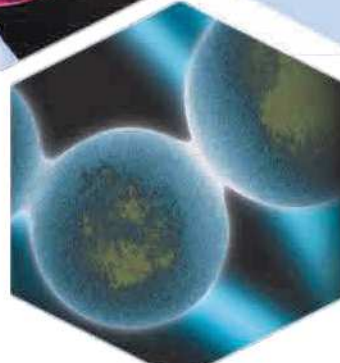
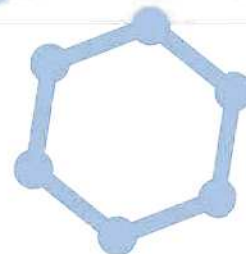
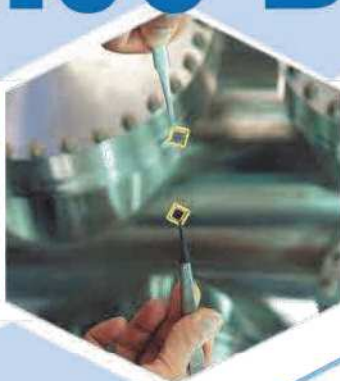
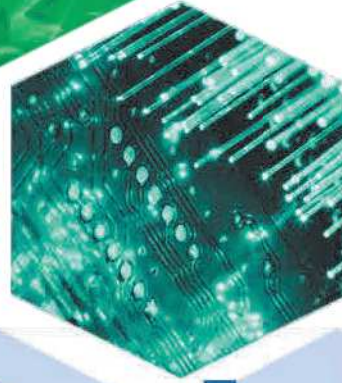
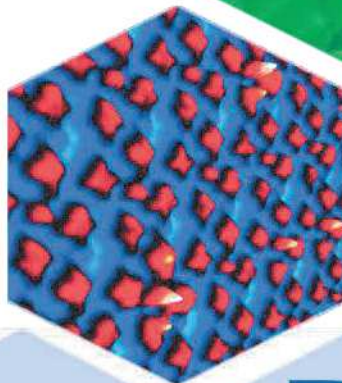
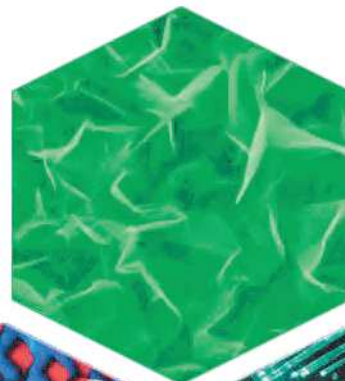


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On behalf of the Organising Committee we take great pleasure in welcoming you for the first edition of the Online Graphene Canada International Conference (GCO2020). This event is launched following the success of previous in-person GrapheneCanada editions (2015 & 2016) and considering that all major scientific and technological conferences are being cancelled or postponed worldwide until middle of 2021.

Graphene and 2D Materials have a huge potential to impact established industrial sectors, building new emerging industries and niche segments and creating economic value. The two-days GrapheneCanada Online Conference (GCO: November 16-17, 2020) will present the most recent advances in R&D, technology developments and business opportunities in the graphene and 2DM sector. This event will provide as well a perspective on the current graphene-related research in Canada. More than 25 worldwide most influential academia & industry experts will present speeches in this international event on how advanced materials will change the future of technology and impact positively our daily life.

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We are indebted to the following Institutions & Companies for their help and/or financial support: CMC Microsystems (Canada), ZEN Graphene Solutions (Canada) and AMO GmbH (Germany).

We also would like to thank all the speakers and attendees that joined us online this year.

We truly hope that Graphene Canada 2020 online serves as a platform for communication between science and business.

Hope to see you again in the next edition of Graphene Canada in 2021.

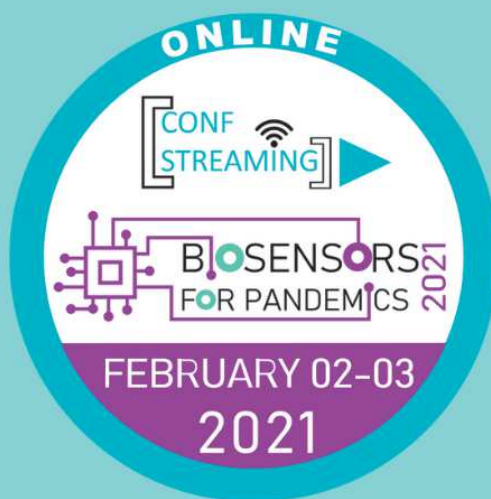
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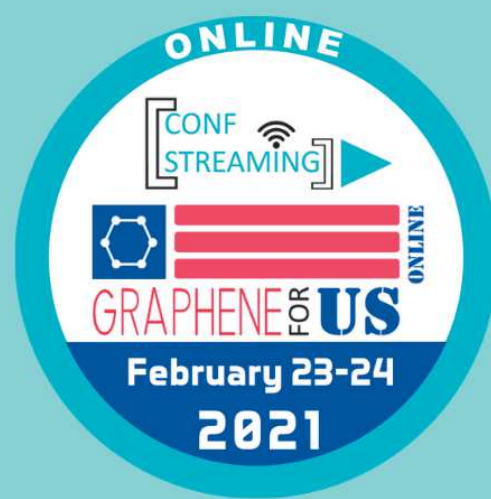
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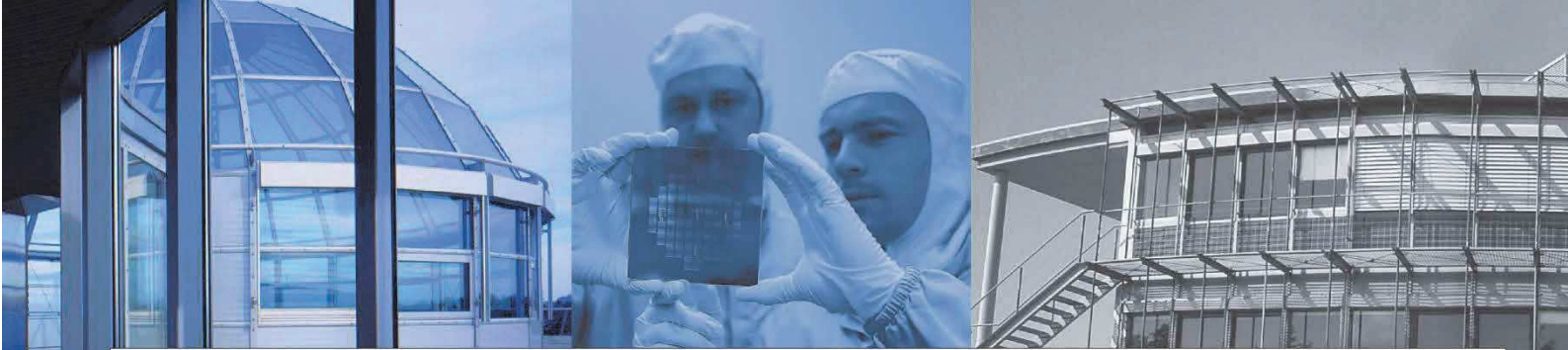
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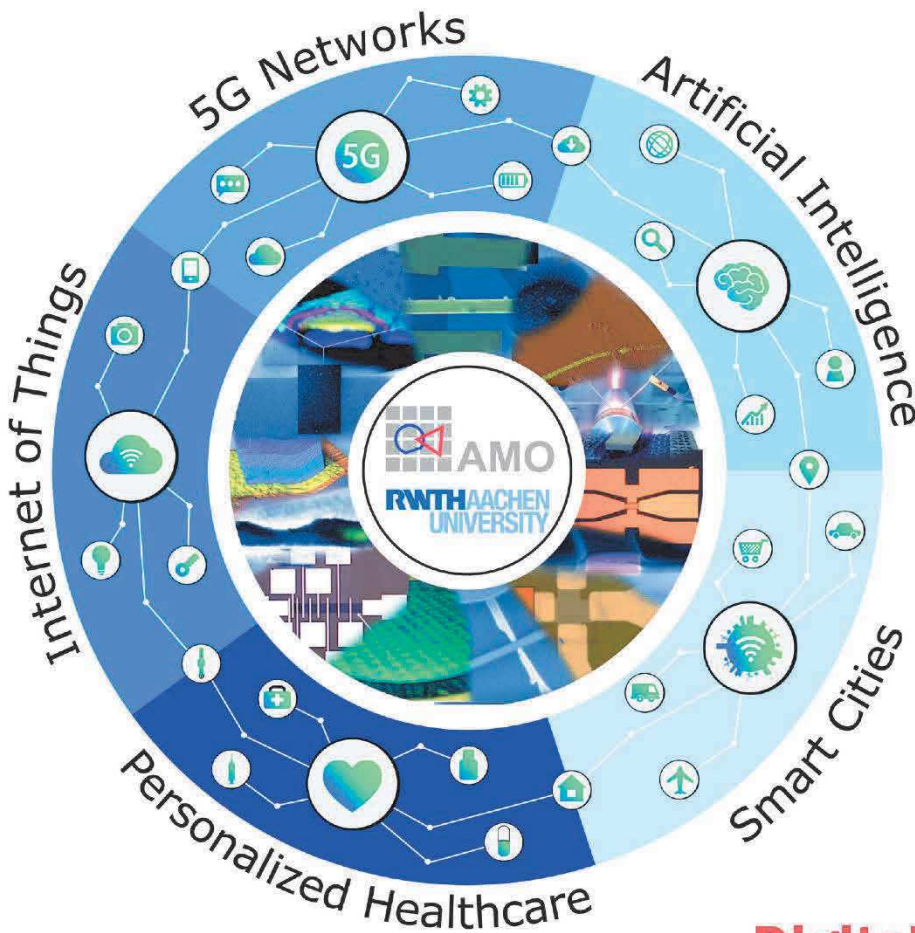
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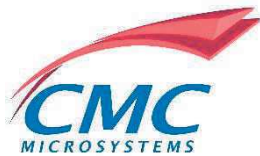
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Graphene-based cement-composite

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Abstract

Nowadays, concrete is a broadly exploited material worldwide, with consumption exceeding thirty billion tons per year and with continued demand growth.[1] The cement production processes have a significant impact on the environment due to considerable CO₂ emissions (*i.e.* 900 kg for every 1000 kg of cement). [2] To solve this environmental problem is necessary to diminish the cement degradation over time, resulting in a reduction of the demand, and thus a reduction in CO₂ emissions. The use of nano additives (*e.g.*, SiO₂ or CaCO₃ nanoparticles) can aid to increase the durability of cement conglomerates.[3] Moreover, nanoparticles can improve additional properties or functions of the cement composites, *e.g.*, self-sensing properties, photocatalytic or electrothermal [4], thus transforming the traditional concrete into a so-called “smart concrete”. Graphene stands out among the wide variety of carbon-based nano additives that could revolutionise the cement composites sector. Nevertheless, the production at a large scale of graphene is still a bottleneck, preventing the commercialisation of the desired smart concretes. [5,6]

In this regard, we used the high-pressure homogenisers (HPH) for the production of multi-layer and few-layers graphene at semi-industrial rates, *i.e.* kg per day (Fig 1a).[7] The high production rate of graphene offered by HPHs enables us for testing innovative graphene-based cement composites (Fig 1b). The few-layer graphene-based mortars produced shown an improvement of ~25% for both the flexural and compressive strength compared to a standard cement mortar.

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FIGURES

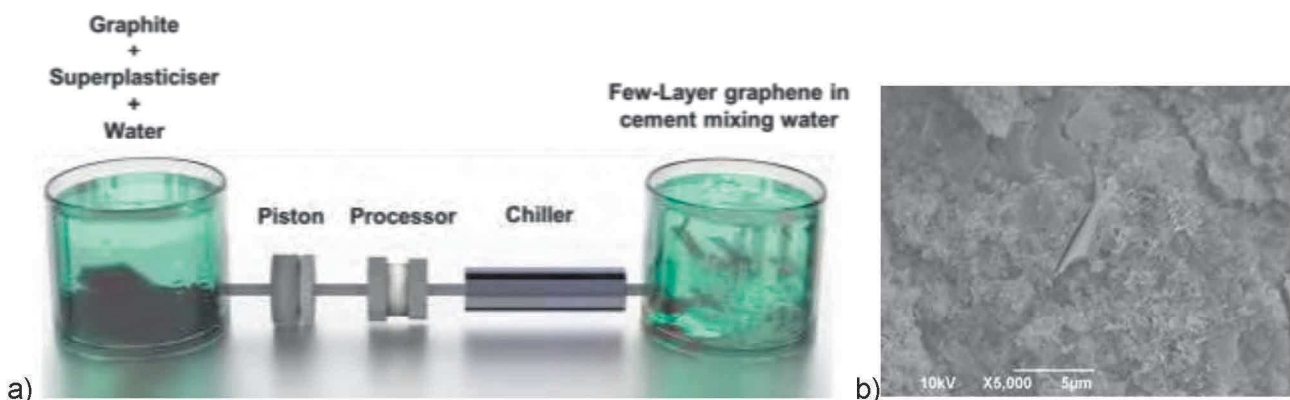


Figure 1: Schematic representation of the production process of FLG using the WJM (a); SEM Image of a graphene flake in the mortar microstructure (b).



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