

Graphene for security and defense

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The long list of unique properties for graphene and 2d materials have been the major driver for intense scientific research. Interestingly, this combination of unique properties has also been the justification for very exciting advances in the development of technological applications. And this led to skyrocketed expectations that flatland applications will become the next disruptive technology impacting several cornerstones of our society.

Indeed, graphene can play a unique role for a wide range of applications, such as broadband sensors for night vision, security, medical imaging, ultra-fast and secure data communications, wearable electronics, energy, composites etc. etc [1,2]. Despite these promises, it is a major challenge to convince large industries to adopt a new material that requires new production processes, new integration strategies and even a new way of thinking. The question arises what aspects of 2d materials can be the starting point to overcome this barrier. It is clear that the true killer applications will make a big impact on our society, but they may come from an unexpected corner and the crucial material properties may be completely different than the ones that drove the initial scientific interest.

In this talk, recent scientific and technological progress of 2d materials in the context of applications for high impact on society, safety and security will be highlighted with a critical reflection on the question whether they will live up to their hype.

[1] **Science and technology roadmap for graphene, related two-dimensional crystals, and hybrid systems.** Ferrari et al., *Nanoscale* 7, no. 11 (2014)]

[2] **Photodetectors based on graphene, other two-dimensional materials and hybrid systems.** Koppens, F. H. L., Mueller, T., Avouris, P., Ferrari, A. C., Vitiello, M. S., & Polini, M. *Nature nanotechnology*, 9(10), 780-793 (2014)