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# 11 - Ultra-thin membranes for sensor applications

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## Abstract

Technological approaches for the fabrication of ultra-thin membranes for sensor applications are reviewed, with the main focus on graphene and two-dimensional (2D) sheets of layered compounds such as BN, $MoS_2$, $Bi_2Te_3$, $Bi_2Se_3$. Highly conducting and transparent electrodes based on graphene are promising for use in flexible, stretchable, foldable electronics. The possibility of building multifunctional three-dimensional (3D) nanoarchitectures based on 2D graphene hybridized with one-dimensional (1D) semiconductor nanostructures is highlighted. The chapter also reviews the fabrication of ultra-thin GaN membranes of nanometer scale thickness by using the concept of surface charge lithography based on low-energy ion treatment of the sample surface with subsequent photoelectrochemical etching.