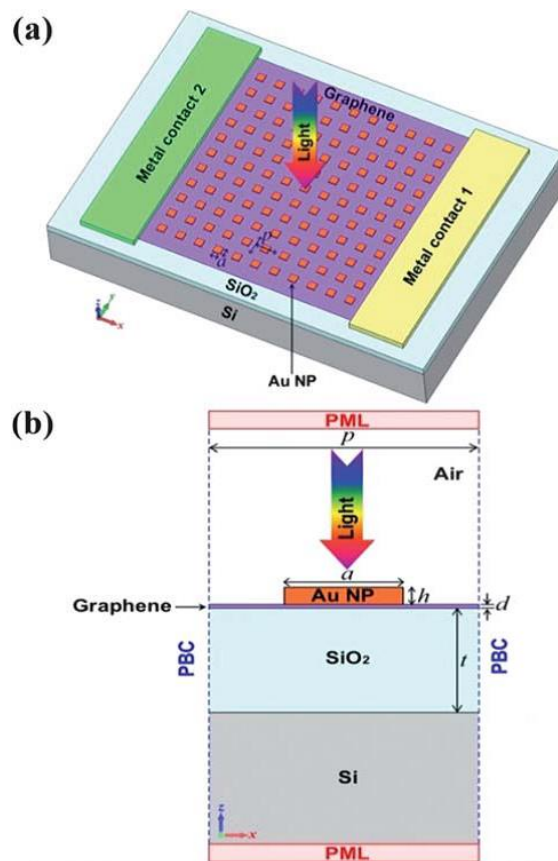
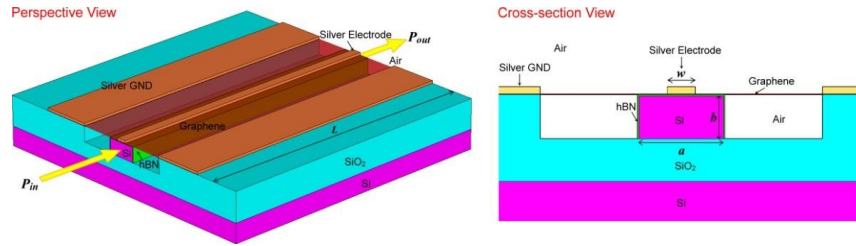


Photodetectors and Modulators

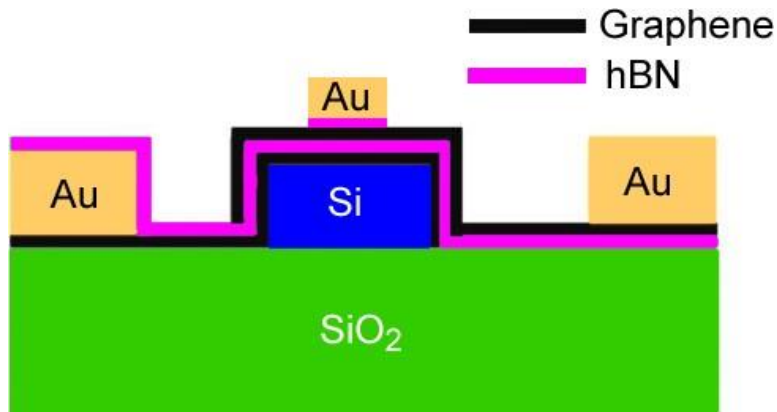
Bioenno Tech is developing and commercializing a novel class of nanotechnology and graphene-based optical photodetectors and modulators for telecommunications. Specifically regarding graphene-based modulators for optical modulators, graphene in terms of electro-absorption presents numerous advantages, the first being that it allows for stronger light-matter interaction as an active layer compared to traditional semiconductors. Furthermore, due to its unique physical properties it is very light, compact and yet has high electro-absorption efficiency. Because of its unique molecular structure and single-atom thickness, graphene is an excellent material in that it not only has high carrier mobility at room temperatures and athermal optoelectrical properties but also is easily scalable and in terms of production and development offers greatly enhanced functionality over more complex traditional methods. It is a highly efficient material with vastly superior performance over the technology offered currently.



i) Schematic drawing of a graphene-based photodetector with plasmonic nanoparticles, and side view of the simulated nanostructure. (Published in "Nanoscale", 2013)



ii). Design of the waveguide-integrated photodetector with suspended graphene



iii). Cross-section design of the waveguide-integrated optical modulator based on two layers of graphene.

Fig. 1 Advanced optoelectronic devices designed by Bioenno Tech for future photo detection and optical communication

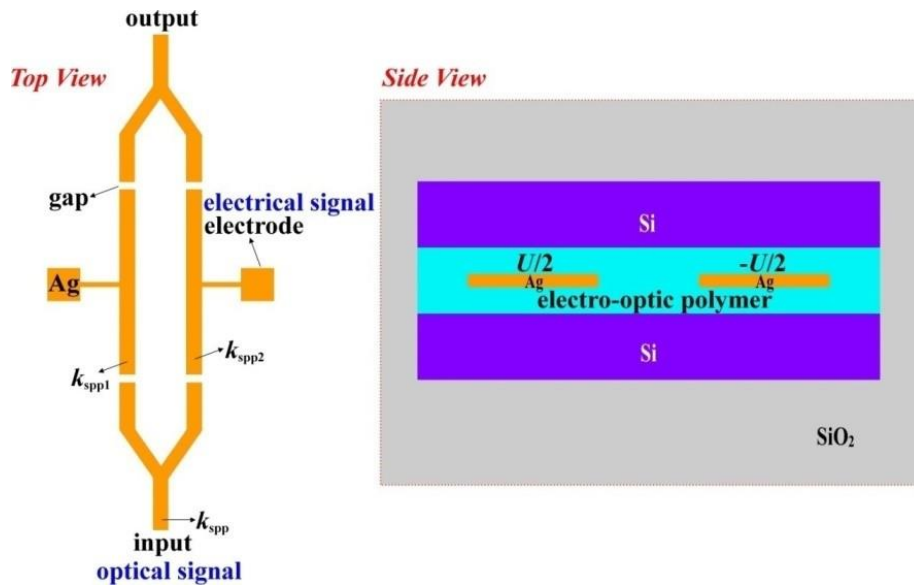


Fig. 2 Schematic drawing of the modulator using slot-based plasmonic waveguides in Bioenno Tech for high speed data transmission