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### Investigation of graphene single layer on P-type and N-type Silicon Hetero-junction Photodetectors

#### Abstract:

Photodetectors are of great interest in several technological applications thanks to their capability to convert an optical signal into an electrical one through light-matter interactions. In particular, broadband photodetectors based on graphene/silicon heterojunctions could be useful in multiple applications due to their compelling performances. Here, we present a 2D photodiode heterojunction based on graphene single layer deposited on p-type and n-type Silicon substrates. We report on the electro-optical properties of the device that have been measured in dark and light conditions into a spectral range from 400 nm to 800 nm. The comparison of the device's performance in terms of responsivity and rectification ratio are presented. Raman spectroscopy provides information on the graphene single layer quality and its oxidation. The results showcase the importance of the doping of the silicon substrate to realize an efficient heterojunction that improves the photoresponse reducing the dark current.

#### Biography

**Carmela Bonavolontà** received in 2002 Bachelor's Degree in Physics and in 2005 her PhD in Chemistry, Materials and Production Engineering from the University of Naples "Federico II" (Italy). From October 2023 she is a researcher assistant at the Institute of Applied Sciences and Intelligent Systems (CNR-ISASI), Pozzuoli (Italy). The current research topics include the development and characterization of broadband photodetectors based on Graphene/Silicon heterojunctions. C.B. is a member of National Quantum Science and Technology Institute (NQSTI). She is author of volumes and more than 100 scientific articles on international peer reviewed journals and several contributions to national and international conferences.