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Abstract for an Invited Paper
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Graphene-based Electronics and Optoelectronics¹

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Graphene has rather unique electrical and properties and there is currently strong interest in taking advantage of these properties for technological applications. In my talk I will review some of the key properties of free graphene, how these properties are affected by environmental interactions and under technologically relevant conditions, and how they can be utilized in electronics and optoelectronics. In electronics, I will focus on high frequency (≥ 300 GHz) graphene transistors and simple IC circuits, as well as related device physics problems, such as the role of electrical contacts, scattering effects, graphene topology, device size scaling, energy dissipation, etc. I will then review the key optical properties of graphene and their use in optoelectronics. Specifically, I will focus on the far-infrared and THz range of the spectrum, on ways of controlling graphene's absorption in this spectral range and provide examples of corresponding applications. I will also discuss photocurrent generation in graphene and its use in ultrafast graphene photodetectors.

¹Work in collaboration with: Y.-M. Lin, D. E. Farmer, Y. Wu, F. Xia, H. Yan, C. Dimitrakopoulos, W. Zhu, M. Freitag, K. Jenkins, A. Valdes-Garcia, T. Low, V. Perebeinos.