

Abstract Submitted
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Direct growth of high quality 2D materials-based metal-semiconductor-metal photodiodes¹

SUDI KSHA KHADKA, MILES LINDQUISTS, THUSHAN WICKRAMASINGHE, RUHI THORAT, SHROUQ ALEITHAN, MARTIN KORDESCH, ERIC STINAFF, Ohio University — Metal-semiconductor-metal photodiodes fabricated using a scalable method, where lithographically defined interdigitated electrodes of bulk molybdenum serve as the growth template for producing self-contacted, as-grown two-dimensional (2D) materials-based devices will be presented. Measurements of first generation devices show photo responsivity of ~ 1 A/W at a source-drain voltage of 1.5 V, which is a few orders of magnitude larger than the values reported under similar measurement conditions. Time resolved measurements show fast responses on the order of ~ 25 us, faster than previously reported values by a factor of three. We will present details on the device growth and characterization including the most current results after optimization. We will also discuss the effects of various processing and passivation techniques on the performance. This original process, using bulk metallic patterns, results in as-grown, self-forming, electrical contact to the monolayer material, providing a simple, scalable, and reproducible method for creating as-grown two-dimensional materials-based devices with broad implications for basic research and industrial applications.

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