Large-Area All-Silicon Infrared Metaoptics

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Recent years have seen the emergence of metasurface optics, or metaoptics, from the laboratory and into consumer applications. Methods for reproducible manufacturing of metaoptics leveraging the capabilities of advanced semiconductor processing are of particular interest. Here I will present our recent results on wafer-scale fabrication of all-silicon metaoptics using the University of Southampton's cleanroom [1]. In a new process, deep-UV lithography is applied on both sides of the wafer, allowing monolithic fabrication of double-sided metalens elements. This approach was successfully applied to the realization of dual-band metaoptics covering both mid-wave and long-wave infrared spectral bands.

References

[1] K Sun, X Yan, J Scott, J-Y Ou, J N Monks and O L Muskens, arXiv:2505.09488 (2025)