S5-PL
Automated Deep Learning Inverse Design of Artificial Electromagnetic Materials

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Research on artificial electromagnetic materials (AEMs) including metamaterials, metasurfaces, photonic crystals, and plasmonics has historically utilized computational electromagnetic solvers to obtain optimized designs. More recently, numerical techniques have been augmented by deep learning approaches for AEM design as both forward and inverse processes. [1] We overview the theory and application of artificial intelligence applied to AEM design and research. Special emphasis is placed on recent developments of agentic frameworks capable of automating the design process and permitting these systems to function as digital researchers. [2]

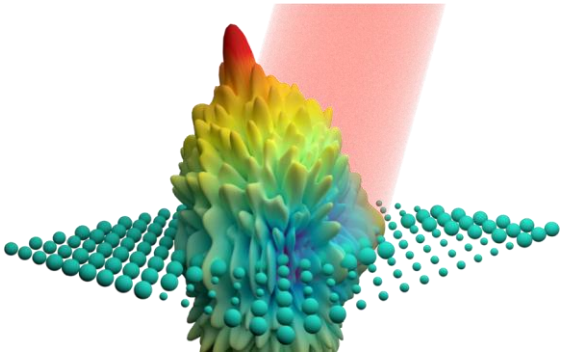

Fig. 1 A deep learning designed metasurface operating in the infrared wavelength regime.

REFERENCES

[1] J. M. Malof, S. Ren, and W. J. Padilla, “Forward and inverse design of artificial electromagnetic materials,” in Advances in Electromagnetics Empowered by Artificial Intelligence and Deep Learning, pp. 345–370 (Wiley, 2023).
[2] D. Lu, J.M. Malof, and W.J. Padilla, An Agentic Framework for Autonomous Metamaterial Modeling and Inverse Design, ACS Photonics **12**, (2025) pp. 6071-6080.