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Plasmonic refraction in random nanowire networks KRZYSZTOF KEMPA, XUEYUAN WU, Boston College, TIANYI SUN, University of Houston, JINWEI GAO, South China Normal University — Metallic random networks have been proposed as replacements for indium tin oxide (ITO) in transparent conductor applications. They offer improved electro-optical performance, mechanical flexibility, and low manufacturing costs. It has been recently demonstrated, that plasmonic refraction is responsible for increased transmission beyond the geometric limit in metallic nanowire arrays (up to 18% in random and up to 130% in periodic arrays)[1]. In this work, we study in detail the increased light transmission due to plasmons in various metallic networks, and discuss means to maximize this effects (for a given network resistance), as well as we propose an extended mean-field theory of light transmission through random metallic networks, which agrees very well with experiments and simulations.

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