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James C. McGroddy Prize Talk - Photonic Metamaterials: Review, Challenging and Opportunities[1]

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In the last decade, a new area of photonic research has emerged, that has given the ability to produce materials with entirely novel electromagnetic properties. Known as metamaterials (MMs) for their ability to take beyond conventional materials. Clearly, the field of MMs can develop mould-breaking technologies for a plethora of applications, where control over light (or more generally electromagnetic radiation) is a prominent ingredient–among them telecommunications, solar energy harvesting, biological and THz imaging and sensing, optical isolators and polarizers. In this talk, I give an introduction into this emerging field, review recent progress (chiral and 3D MMs, bringing gain to MMs, and what is a good conductor for use in MMs and in plasmonics and Casimir forces) and highlight remaining challenges and opportunities.

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