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**Kinetic simulations of artificial plasma material structures**[1] JAN TRIESCHMANN, THOMAS MUSSENBROCK, Institute for Theoretical Electrical Engineering, Ruhr-University Bochum — Artificially structured materials with underlying spatial periodicity (photonic crystals) are known for their unique electromagnetic properties. These materials allow to restrict propagation of electromagnetic waves within certain frequency ranges, in particular in the microwave regime. Electromagnetic bandgaps as well as complex waveguide structures can be achieved. In this contribution we study the influence of microplasmas on the electromagnetic behavior of these metamaterials. We show that the electromagnetic wave propagation can be completely suppressed by activating the microplasmas. In order to understand the interaction in detail, we investigate the electromagnetic response of a bulk plasma as well as a one-dimensional array of plasmaslabs by means of self-consistent kinetic simulations. Hereby we find that fully plasma based photonic crystals indeed can be achieved, enabling for the unique switchable manipulation of electromagnetic waves in the microwave regime.

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