

Abstract Submitted
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Control of microwave propagation property with metamaterials and tuned plasma. CHUI INAMI, YUKI KABE, AKINORI IWAI, ALEXANDRE BAMBINA, SHIGEYUKI MIYAGI, OSAMU SAKAI, University of Shiga Prefecture — Metamaterial researches have been reported on the validity of not only cloaking devices but also layers of absorption, reflection and scattering. This study demonstrates tunability of plasma-metamaterials switchable for these wave propagation properties using experimental and numerical results. Our first aim is to verify a cloaking phenomenon, which has been one of the successful principles based on transformation optics [1]. General metamaterial cloaks have difficulties in terms of the complexity and the excessive thickness of cloaking layers because the layers require elaborate designs of the refractive index. To solve it, we combined solid metamaterials with gaseous plasma [2]. Plasma has inherent gradients, which brings simplification and miniaturization to the layers. In addition, permittivity of plasma is tunable by controlling electron density in plasma. Turning on/off and tuning plasma power enables physical wave reactions to switch instantly with one device for a cloak, an absorber, a reflector, and scatterer, which is our second aim in this study. [1] J. Pendry, D. Schurig, D. Smith, *Science*, 314, 977 (2006). [2] O. Sakai, S. Yamaguchi, A. Bambina, A. Iwai, Y. Nakamura, Y. Tamayama, S. Miyagi, *Plasma Physics and Controlled Fusion*, 59, 014042 (2017).

Chui Inami
University of Shiga Prefecture

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