

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Graphene-enabled electrically switchable radar absorbing surfaces OSMAN BALCI, EMRE OZAN POLAT, NURBEK KAKENOV, COSKUN KOCABAS, Bilkent University — Radar absorbing materials are used in stealth technologies for concealment of an object from radar detection. Resistive and/or magnetic composite materials are used to reduce the backscattered microwave signals. Inability to control electrical properties of these materials however, hinders the realization of active camouflage systems which require adaptive surfaces operating in microwave frequencies. Here, using large-area graphene electrodes, we demonstrate a new class of active surfaces which enables unprecedented ability to control reflection, transmission and absorption of microwaves by electrical means. Instead of tuning bulk material property, our strategy relies on electrostatic tuning of the charge density on an atomically thin electrode which operates as a tunable metal in microwave frequencies. Notably, we fabricated large area adaptive radar absorbing surfaces with tunable reflection suppression ratio up to 50 dB with operation voltages less than 5 V. These electrically switchable radar absorbing surfaces provide a significant step in realization of active camouflage systems and adaptive cloaking in microwave frequencies, which cannot be realized by conventional materials.

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Date submitted: 14 Nov 2014

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