# Microfluidic Metasurface for Dispersion-free Anomalous Reflection

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## Abstract

Metasurfaces are ultra-thin planar structures designed with extraordinary electromagnetic properties from the interaction between the subwavelength scatterers and the electromagnetic radiation. Nevertheless, the dispersion nature imbedded in the metallic resonator of the metasurfaces leads to the variation of the angle of reflection. The reflection angle changes with the incident frequency of the electromagnetic waves. Here, we demonstrate, for the first time, an active metasurface with dynamically controllable dispersion by individually reconfiguring the geometry (shape and orientation) of the resonators. The latter are liquid metal rings structured and controlled by a microfluidic system. By tailoring the phase profile of the scattered light, we present a dispersion-controllable beam steering function whereby the steering angle is kept at -45˚ for three normal incident frequencies of 10.5, 12 and 14 GHz. Such active metasurfaces have potential applications in 2 directional communication devices, multi-frequency tracking Radar systems, and broadband scanning system.

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