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Dark Acoustic Metamaterials JUN MEI, Department of Physics, South China University of Technology, Guangzhou 510641, China, GUANCONG MA, MIN YANG, ZHIYU YANG, WEIJIA WEN, PING SHENG, Department of Physics, Hong Kong University of Science and Technology, Hong Kong, China — The attenuation of low-frequency sound has been a challenging task because the dissipation of materials in this regime is inherently weak. Here we show that by using thin elastic membranes decorated with asymmetric rigid platelets, the resulting acoustic metamaterials can reach almost unity absorption at frequencies where the relevant sound wavelength in air can be three orders of magnitude larger than the membrane thickness. At resonances, the measured displacement profiles show slope discontinuities around the platelet perimeters, implying significantly enhanced elastic curvature energy is concentrated in these small volumes. This thereby gives rise to strong absorption similar to a cavity system, even though the system is geometrically open.

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