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Broadband radar absorption and mechanical behaviors of bendable over-expanded honeycomb panels

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Abstract: When over-expanded, the hexagonal honeycomb (HH) turns to bendable quadrilateral honeycomb. The over-expanded honeycomb (OH) is anisotropic. In-plane crushing behaviors of the OH were revealed by experiments. Compressed along arm-chair direction, the OH has three deformation modes, turning from quadrilateral honeycomb, re-entrant hexagonal honeycomb to triangular honeycomb. The Poisson's ratio turns from zero, negative to positive. Compressed along the beeline direction, the OH is crushed at shear buckling band. The equivalent strength and modulus change with the compression direction and consistently predicted by structural models. Coated with carbon powder based absorbing material, the OH turns to a multifunctional material. The microwave absorbing behavior changes with the relative density and the thickness of the OH. Oblique incidence