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Crystal Critters: Growth and ejection of crystals from heated, superhydrophobic surfaces[1] SAMANTHA MCBRIDE, HENRI LOUIS GIRARD, KRIPA VARANASI, Massachusetts Institute of Technology — Evaporating a drop of a volatile liquid containing a non-volatile solute leads to crystallization of said solute due to rising concentrations exceeding the solubility limit. When a drop of salty water is evaporated on a hydrophobic surface, "salt globes" that mirror the shape of the drop form due to nucleation at the air/water interface. Here, we present an unusual phenomenon in which salt globes grown from an evaporating drop on a heated superhydrophobic surface proceed to self-eject from that surface via growth of crystalline tubules. We show that this phenomenon is due to a specific superhydrophobic texture that combines minimal contact points and an assortment of channels that allow vapor to escape. A large temperature gradient across the height of the drop concentrates vaporization near the substrate, and escaping vapor at contact points between substrate and liquid leads to growth of crystalline tubules. These tubules grow into "legs," causing the entire salt globe – and any remaining water – to lift off from the surface. We call these structures composed of salt globes balanced on tubule legs "crystal critters" due to their resemblance to biological forms. Following complete evaporation, the crystal critters have minimal contact with the substrate and can be easily removed; and could find application for anti-fouling surfaces for spray heat exchangers.

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