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Self-propelled film-boiling liquids HEINER LINKE, MICHAEL TAORMINA, BENJAMIN ALEMAN, LAURA MELLING, COREY DOW-HYGELUND, RICHARD TAYLOR, University of Oregon, MATTHEW FRANCIS, University of Sydney — We report that liquids perform self-propelled motion when they are placed in contact with hot surfaces with asymmetric (ratchet-like) topology. Millimeter-sized droplets or slugs accelerate at rates up to 0.1 g and reach terminal velocities of several cm/s, sustained over distances up to a meter. The pumping effect is observed when the liquid is in the film-boiling regime, for many liquids and over a wide temperature range. We propose that liquid motion is driven by a viscous force exerted by vapor flow between the solid and the liquid. This heat-driven pumping mechanism may be of interest in cooling applications, eliminating the need for an additional power source.

Heiner Linke
University of Oregon

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