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Writing on water with permanent markers[1] SEPIDEH KHODAPARAST, FRANÇOIS BOULOGNE, HOWARD A. STONE, Complex Fluids Group, Princeton University — Permanent markers create a continuous thin stain on a surface, which, after drying, can only be removed by high pressure cleaning or organic solvents. The stains of the markers are hydrophobic and thus effectively resist rinsing by water. We introduce a peeling technique based on surface tension, which benefits from this hydrophobicity, to transfer complex two-dimensional marks onto the air-water interface. As an air-water meniscus reaches the stain edge, the surface tension applies a detachment force to the thin layer. If larger than the adhesion of the stain on the substrate, the surface tension can peel off the entire layer. We examine the efficiency of this peeling method for elastic thin films in an experimental model made of thin polystyrene films of well-controlled geometrical properties adhering on clean glass substrates. We investigate the effect of film thickness and interface velocity. At low interface velocities $U < 1$ mm/s, films of thicknesses down to 50 nm are peeled and transferred to the air-water interface with no defects. Peeling with the meniscus can be used in a large variety of applications such as water-assisted transfer printing, peel-and-stick technologies, cleaning the water proof stains without solvent and fabrication of flexible wearable electronics.

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