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Wrapping with a splash DEEPAK KUMAR, University of Massachusetts Amherst, JOSEPH PAULSEN, Syracuse University, THOMAS RUSSELL, NARAYANAN MENON, University of Massachusetts Amherst — Ultrathin sheets have been used to encapsulate drops of one fluid in another. When the sheet is thin enough that bending energies are much smaller than interfacial energies, experiment and theory show that optimal wrappings are achieved without any special sheet design [1]. Here we study wrappings generated by the impact of an oil droplet onto an ultrathin (30-200 nm) polystyrene film floating on water. Depending on the energy of impact, a large deformation of the air-water interface is followed by formation of an oil phase wrapped around by the polymer film, submerged in the water. Even though the energetic cost of bending of the polymer film is very small, we find that successful wrapping requires an impact energy much larger than the energy difference between the initial and final configurations. We explore the dynamics of the fluid and the sheet in this process with a view to devising an efficient method to create optimal wrappings. [1] J.D. Paulsen, V. Dmery, C.D. Santangelo, T.P. Russell, B. Davidovitch, and N. Menon, doi:10.1038/nmat4397 (2015).

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