Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Elasto-capillary torsion at a liquid interface ALEXANDROS ORATIS, TIMOTHY FARMER, JAMES BIRD, Boston University — When a liquid drop wets a solid, the droplet typically spreads over the solid. By contrast, for sufficiently compliant solids, the solid can instead spread around the drop. This wrapping phenomenon has been exploited to assemble 3-dimensional structures from 2-dimensional sheets, a process often referred to as capillary origami. Although existing studies of this self-assembly have demonstrated bending and folding, methods of inducing spontaneous twisting by means of capillarity are less clear. Here we demonstrate that spontaneous twist can be initiated in a compliant solid through a combination of surface chemistry and capillarity. Experimentally, we measure the angle of twist on a surface with binary patterns of surface wettability as we vary the solid's geometric and material properties. We develop a scaling law to relate this angle of twist to the elastic and interfacial properties, which compares well with our experimental results.

Alexandros Oratis
Boston University

Date submitted: 01 Aug 2016 Electronic form version 1.4