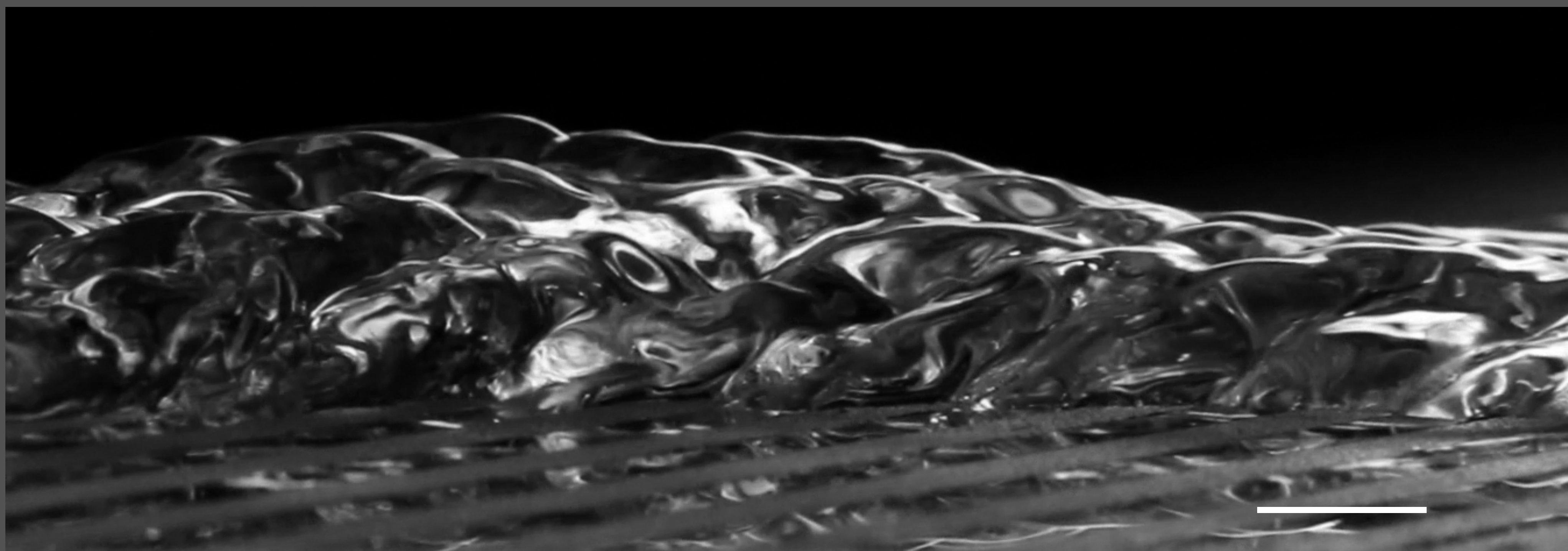


# Spatial flow modulation by patterned surface properties

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**Above:** Side view of 1.6mm thick sheet flowing over a patterned surface. Scale bar is 5mm. Flow is left to right. **Right:** Top view of the flow. Flow is top to bottom. Color represents height of flow features (0 – 12mm).

What happens when water flows over a surface that is partly hydrophobic and partly hydrophilic? Wishing to answer this question, we observed a sheet of water flowing over an inclined surface with alternating hydrophobic and hydrophilic bands. The sheet rearranges itself into the pinecone structure seen to the right. The sheet's contraction over hydrophobic regions and expansion over hydrophilic regions results in the pinecone's scales while the interplay of gravity, surface tension, and inertia contributes to the overall braided shape. The flow exhibits complex hydrodynamics with height variations at every point in the flow, roller structures at hydrophilic- hydrophobic interfaces (shown above), and air entrainment at certain flow rates and inclination angles.

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