Bubble Formation in Layered Liquids

This research project involves quantitative analysis of bubbles blown from an orifice, in liquids having different combinations of viscosity. Most people recognize single bubbles forming as spheres, or hemispheres (when on a flat surface). However, in cases of changing viscosity, different interesting, non-spherical shapes can appear. The motivation behind this project follows the question(s) of:

1) When gas is dissolved in molten geologic materials, glasses or polymers and it nucleates out as bubbles, what effect do thermal gradients in those materials have on bubble shape?

2) If we can set up a material with a viscosity gradient, or layered viscosity, will this enable designer shapes of bubbles for different applications?

Work plan

Our laboratory is equipped with all the necessary tools to carry out this work, including a mechanized syringe, containers with orifices, silicone-based oils of different viscosity, and video cameras. The research student will be responsible for (i) making liquid layers of different viscosities, (ii) running the syringe pump to create bubbles in different materials, and (iii) filming all experiments. If the student candidate has interest, there is ample opportunity for further engineering or design work.