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Interfacial flows in micro-channels: flow regimes and transitions MAJID AHMADLOUYDARAB, PENG GAO, JAMES J. FENG, University of British Columbia — We report simulations of gas-liquid flows in periodically patterned micro-channels with grooves and ridges. A diffuse-interface model is used to handle the interfacial motion and the three-phase contact line. A constant body force applies on both components to simulate a pressure-driven flow. Depending on the competition between the driving force and capillary force and the level of liquid saturation, several flow regimes have been observed in the micro-channel, including slug flows with air bubbles, slug flows with water drops, water rivulets alongside air flow and driven sessile drops. We investigate the critical conditions for the transition among the regimes as affected by substrate wettability, initial morphology of the interface, geometry of the micro-channel and viscosity ratio.

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