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Air Bubbles Rise through Carbopol Water Two-layer System KAI ZHAO, EDMUND TEDFORD, MARJAN ZARE, IAN FRIGAARD, GREGORY LAWRENCE, University of British Columbia — We have conducted laboratory experiments, injecting air bubbles into a layer of Carbopol capped by a layer of water, to mimic ebullition in aquatic systems where bubbles rise through sediment and overlaying waterbodies. In a single experiment, around 60 bubbles rise through the two-layer system. A variety of behaviors has been observed. The first bubble creates a path inside the Carbopol layer, which is utilized by the following bubbles. Due to the passage of bubbles, a tube will gradually develop inside Carbopol, and overlaying water will flow into this tube. Inside the tube, the shape of the rising bubble resembles Taylor bubbles. However, its rise speed is much greater than Taylor bubbles and greater than its speed in water cap. When rising bubbles go through the Carbopol-water interface, bubble tails can be pinched off, leaving small bubbles beneath the interface. The pinched-off small bubble can sometimes increase the speed of the next bubble inside the tube by about 20%.

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