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Long term stability of immiscible ferrofluid/water interfaces BERNARD MALOUIN, DAVID POSADA, AMIR HIRSA, Rensselaer Polytechnic Institute — Recently we have demonstrated pinned-contact, coupled droplet pairs of aqueous ferrofluids in air that can form electromagnetically-activated capillary switches and oscillators. The great variety of available ferrofluids, however, enables the use of immiscible oil-based ferrofluid droplets in a water environment to obtain the same behavior. Such immersed ferrofluid oscillators exhibit natural frequencies (for 5 mm devices) of about 10 Hz. Here we report on the observation of a gradual *increase* in the resonant frequency of the system in time. Experimental observations suggest that the drift in the natural frequency is a consequence of changes occurring at the ferrofluid/water interface. The interfacial structure of such a complex system (water, oil, surfactant, iron particles) is examined along with its evolution in time, using various microscopy techniques.

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