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Trapping fluctuations in confined carbon dioxide near the supercritical ridge MANFRED HEUBERGER, ERICH SCHURTENBERGER, EMPA, Materials Science and Technology, CH-9014 St. Gallen — We investigate the properties of a confined supercritical carbon dioxide film. Density fluctuations are theoretically predicted near the critical point and along the supercritical extension of the liquid-gas coexistence line (ridge). We have confined carbon dioxide between two atomically smooth surfaces in a new generation of surface forces apparatus. The nanometers to micrometer films are found to be laterally divided into nano domains of two distinct refractive indices. The two-refractive index structure is apparent, yet different on behavior, above or below the supercritical ridge. This non-equilibrium phase separated film exhibits long-range attractive forces (up to 500 nm), which results from an interfacial energy between the different domains. High refractive nano domains can be trapped and stretched to lengths of several micrometers, until we observe coalescence of the domains. Our observations suggest that density fluctuations can be trapped and pinned between surfaces in the form of nano strings of significantly different molecular order.

Manfred Heuberger
EMPA, Materials Science and Technology, CH-9014 St. Gallen

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