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Evaporation-triggered ouzo effect in a Hele-Shaw cell[1] RICARDO ARTURO LOPEZ DE LA CRUZ, NOOR SCHILDER, Physics of Fluids Group, University of Twente, XUEHUA ZHANG, Department of Chemical & Materials Engineering, University of Alberta; Physics of Fluids Group, University of Twente, DETLEF LOHSE, Physics of Fluids Group, University of Twente; Max Planck Institute for Dynamics and Self-Organization — The ouzo effect, a process of spontaneous emulsification in ternary liquid mixtures, displays unexpected phenomena when confined in a Hele-Shaw cell. Namely, branch-like patterns composed of nucleated droplets can appear under many different conditions, showing a remarkable universality [Lu Z, et al., PNAS, 114, 10332, (2017)]. In this work we further explore the droplet pattern formation due to the ouzo effect in a Hele-Shaw cell, but this time triggered by selective evaporation of the good solvent. We observed that the branch-like patterns were hindered by a solutal Marangoni instability at the liquid-air interface for certain initial solution compositions. By increasing the initial solute concentration, we were able to go from homogeneous surface droplet formation, to bulk separation and finally recover the branch-like patterns. Comparison of these phenomena with the case of an evaporating binary system allowed us to understand the initial instability as the result of the different surface tensions and volatilities between the two evaporating liquids. Furthermore, this led us to understand the regions of droplet formation and phase separation in the ternary system as regions where the instability caused accumulation of the poor solvent.

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