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**Experimental study on viscous fingering with partial miscible fluids.** RYUTA SUZUKI, YUICHIRO NAGATSU, Department of Chemical Engineering, Tokyo University of Agriculture and Technology, MANORANJAN MISHRA, Department of Mathematics Indian Institute of Technology Ropar, TAKAHIKO BAN, Graduate School of Engineering Science, Osaka University — Viscous fingering (VF) instability occurs when a more viscous fluid is displaced by a less viscous one in porous media or Hele-Shaw cells. So far, studies of VF have focused on fluids that are either fully miscible or immiscible. However, little attention has been paid to VF in partially miscible fluids. Here, we have experimentally investigated VF in a radial Hele-Shaw cell using an aqueous two phase system (Ban et al. *Soft Matter*, 2012) which is an example of partially miscible fluids system. We have found novel instabilities that are counter-intuitive in miscible and immiscible systems. These include multiple droplets formation for low flow rate and widening of fingers at intermediate flow rate. The occurrence of the new instability patterns is induced by Korteweg effect in which convection is induced during phase separation in partially miscible systems.

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