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Deformation of interface in a partially miscible system during favorable displacement RYUTA SUZUKI, YUICHIRO NAGATSU, Tokyo Univ of Agri Tech, MANORANJAN MISHRA, Indian Institute of Technology Ropar, TAKAHIKO BAN, Osaka University — The Saffman-Taylor instability triggers a well-known viscous fingering (VF, called unfavorable displacement), occurring when a less viscous fluid displaces a more viscous one in porous media or in a Hele-Shaw cell because the boundary of the two fluids becomes hydrodynamically unstable. In the reverse situation (called favorable displacement) in which a more viscous fluid displaces a less viscous one, no instabilities occur due to hydrodynamically stable system. It has been reported that the favorable displacements become unstable by several physicochemical effects. So far, studies of both displacements have focused on fluids that are either fully miscible or immiscible. However, little attention has been paid to displacements in partially miscible system. Here, we have discovered that a partial miscibility triggers fingering instability in a favorable displacement without any chemical reactions. The occurrence of this new instability is induced by not hydrodynamic effects but a thermodynamic effect that is so-called Korteweg effect in which convection is induced during phase separation process in a partially miscible system.

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