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Pattern transition from fingering to fracturing in a reacting Hele-Shaw flow TOMOHIRO UJIIE, YUICHIRO NAGATSU, MITSUMASA BAN, YOSHIHITO KATO, YUTAKA TADA, Nagoya Institute of Technology, Japan —
We have experimentally investigated pattern formation obtained when a more viscous aqueous polymer solution is displaced by a less viscous solution including a metal ion in a Hele-Shaw cell. When the two liquids contact, a chemical reaction takes place and a gel is formed. For some concentrations of the polymer and the metal ion, a transition from fingering pattern to fracturing pattern is demonstrated as the injection rate exceeds threshold value. The fingering-fracturing transition is sufficiently abrupt that no gradual transition has been observed. When there is no metal ion in the less viscous solution (non-reactive case), the transition was never observed. These results are similar to those obtained in a Hele-Shaw experiment using an associating polymer solution (Zhao & Maher, *Phys, Rev, E*, 47, 4728, (1993)). We have measured the rheological property of the gel by means of a rheometer and investigated the relationship between the observed fingering-fracturing transition and the measured rheological property. Finally, we discuss the similarity between the present result and the result obtained by Zhao & Maher.

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