Capillary Rise of Visco-elastic Materials

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Viscoelastic materials, for example, ketchup and slurry, has both storage modulus (G') and loss modulus (G"), behaving both solid-like and liquid-like depending on the applied force. Among them, polymeric solutions including Xanthan are well known to improve the efficiency of enhanced oil recovery (EOR). The reason is presumed that Xanthan's viscoelastic property solves the flow instability at the liquid-liquid or liquid-air interface, while more detailed origin is not discovered, yet. In this work, we systemically demonstrate the capillary rise of xanthan solutions to mimic pore scale dynamics in porous media. The moduli is changed by varying concentrations of xanthan and salt. In a certain range of moduli, the rise behavior changed from one-phase to two-phase . Based on rheology measurement and capillary rise experiment, we tried to model the peculiar capillary rise behavior based on the moduli.