Capillary Kinetics of Thin Polymer Films in Permeable Microcavities

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We present a Poiseuille model that can explain the rate of capillary rise of thin polymer films in permeable microcavities. In comparison to the traditional Poiseuille formulation, two unique features of the system were considered: the permeable nature of the enclosure and the effect of thin polymer films that are confined to the substrate. The model predicts that the rate is inversely proportional to the channel width, contrary to what the original Poiseuille model predicts, and it is proportional to the initial film thickness, which the original model cannot account for. The modified model is in satisfactory agreement with experimental data.