ABSTRACT

The measurement of local temperature distributions within a membrane distillation (MD) channel is a crucial step for the optimization of the channel and spacer geometry. This information allows the estimation of temperature polarization phenomena, which can dramatically influence the thermal efficiency of the process and the optimal choice of the geometric configuration (net spacer features, channel size, etc.). In the present work, a recently presented experimental technique, based on the use of thermochromic liquid crystals and digital image analysis, has been employed in order to assess the temperature polarization phenomena. The local heat transfer coefficient distribution on the membrane surface in a MD spacer-filled channel was thus assessed. The membrane has been modelled by a heat transfer polycarbonate layer. Different diamond spacer geometries were investigated, in order to highlight how the geometrical features affect both pressure drop and heat transfer in spacer-filled channels.

Keywords: Membrane distillation; Thermochromic liquid crystals; Heat transfer; Temperature polarization; Digital image analysis

Assessment of temperature polarization in membrane distillation channels by liquid crystal thermography

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