In-situ Liquid Accessible Volume Measurement of Polymer Films
Using Surface Plasmon Resonance  
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Many physical properties of a polymer in contact with liquid can be markedly af-
fected by the amount of the liquid that can penetrate into the polymer matrix. The 
liquid accessible volume in a polymer matrix is difficult to determine at elevated 
temperatures and not possible with simple weight gain measurements. A high sen-
sitivity optical Surface Plasmon Resonance (SPR) technique, which has been widely 
used in chemical and biomedical applications, was developed for determination of 
liquid accessible volume in a polymer matrix at both room and high temperatures 
(up to 150 °C). Experimental results and theoretical calculation are in excellent 
agreement. Hysteresis in liquid accessible volume as a function of organic liquid 
was observed when temperatures were cycled between room and high temperatures. 
The newly developed SPR technique for accessible volume determination has a great 
potential for in-situ characterization of a polymer matrix in contact with liquid.

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