Homogenization of drop stain by radial electroosmotic flow in an evaporating drop

김성재, 강관형[1], 강인석, 윤병준*
포항공과대학교; [1]University of Toronto
(bjyoon@postech.ac.kr*)

Non-uniform distribution of solute in an evaporating drop placed on a solid surface is an important problem in TAS technology. This phenomenon can be observed in microarray and matrix systems used for analyzing DNA and protein samples. When a sample drop on a solid surface evaporates, the transport of solute caused by the outward radial flow near the drop surface yields a ring-shaped stain on the solid surface. The contact line pinning and the diffusion limited evaporation might contribute to the outward migration of solute. Such localization of solute may hinder accurate analysis of drop sample, and it is desirable to devise a scheme for homogenizing the solute distribution inside a drop.

In this work we study the utility of electroosmosis as an effective mean for controlling the drop stain. The electric field developed between the center and the circular electrode placed along the drop rim causes an EOF. By changing the polarity and the applied voltage we can control the strength and direction of the radial electroosmotic flow, and thus we can modify the solute distribution inside the drop. Detailed experimental results along with theoretical analysis will be presented.