

## Breath-Figure Approach of Preparing Inverse Opal Gold Nanocrystal Films

이태승, 이도창\*

KAIST

(dclee@kaist.edu\*)

Breath figures formed on a liquid substrate on contact with humid air can serve as templates for mesoporous structures. When water droplets are formed on liquid solution of gold nanocrystals (AuNCs), the final solid product can be AuNC film with periodic arrays of holes. The periodicity is a key requirement for applications such as waveguide. En route to fabrication of 2-dimensional inverse opals with high periodicity, we investigate morphological changes of the resulting AuNC film while changing various parameters, such as size of the Au NCs, the capping ligand, the dispersion concentration, the solvent, and the relative humidity. In this study, we specifically aim to identify the changes derived from the AuNC size ( $R_{NC}$ ) increases according to the relevant equation,  $E = \pi R_{NC}^2 \gamma_{cw} (|1 - \cos \Theta_{cw}|)^2$ . In addition, we examine morphology of the film at different parts of a substrate to see how the Marangoni convection influences the hole formation. Finally, we study the effect of capping ligands on AuNCs on long-range periodicity on the holey AuNC films by preparing NCs with 2 types of capping ligands: alkylthiol (e.g., 1-dodecanethiol) or fluorinated thiol (e.g., fluoroethyl methacrylate-thiol).