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**Spontaneous Ion Depletion and Accumulation Phenomena Induced by Imbibition through Permselective Medium**[1] HYOMIN LEE, Seoul Natl Univ (SNU), YEONSU JUNG, SUNGMIN PARK, HO-YOUNG KIM, SUNG JAE KIM, SNU — Generally, an ion depletion region near a permselective medium is induced by predominant ion flux through the medium. External electric field or hydraulic pressure has been reported as the driving forces. Among these driving forces, an imbibition through the nanoporous medium was chosen as the mechanism to spontaneously generate the ion depletion region. The water-absorbing process leads to the predominant ion flux so that the spontaneous formation of the ion depletion zone is expected even if there are no additional driving forces except for the inherent capillary action. In this presentation, we derived the analytical solutions using perturbation method and asymptotic analysis for the spontaneous phenomenon. Using the analysis, we found that there is also spontaneous accumulation regime depending on the mobility of dissolved electrolytic species. Therefore, the rigorous analysis of the spontaneous ion depletion and accumulation phenomena would provide a key perspective for the control of ion transportation in nanofluidic system such as desalinator, preconcentrator, and energy harvesting device, *etc.*

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