Si Nanocrystal-Embedded SiO_x nanofoils for High Performance Li Storage Materials synthesized solution evaporation induced interfacial sol-gel reaction

Hyundong Yoo[a] , Eunjun Park [a], Juhye Bae [a] , Jaewoo Lee [b], Dong Jae Chung [a], Yong-Nam Jo [c], Min-Sik Park [d,*], Jung Ho Kim [b], Shi Xue Dou [b], Young-Jun Kim [e], Hansu Kim [a,*]

[a] *Department of Energy Engineering, Hanyang University, 222 Wangsimni-ro, Seongdong-gu, Seoul 133-791, Republic of Korea*

[b] *Institute for Superconducting and Electronic Materials (ISEM), Australian Institute for Innovative Materials (AIIM), University of Wollongong, North Wollongong, New South Wales 2500, Australia*

[c] *Advanced Batteries Research Center, Korea Electronics Technology Institute, Seongnam 463-816, Republic of Korea*

[d] *Department of Advanced Materials Engineering for Information and Electronics, Kyung Hee University, Yongin 17104, Republic of Korea*

[e] *SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, Suwon 16419, Republic of Korea*

E-mail: gusehd1046@naver.com

Silicon is an anode material that garnered attention as a potential replacement of graphite due to its high theoretical capacity (3,580 $mAhg^{-1}$). However, Si anode materials have critical limit for commercial use because of their poor cycle performance associated with severe volume changes during cycling. In this work, we synthesize two-dimensional SiO_x material by solution evaporation induced interfacial sol-gel reaction. This synthesis method is simple, cost-effective and scalable. 2-Dimension SiO_x showed stable cycle performance with reversible capacity of about 650 $mAhg^{-1}$, and high current density of 50 C (50 A g^{-1}). More detailed analysis of two-dimensional SiO_x materials will be discussed in this presentation.