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Clay nanosheets in skeletons of controlled phase inversion separators for thermally stable Li-ion batteries

Jong Hyeok Park and **Min Kim**
Yonsei University, Republic of Korea

Phase inversion is a powerful alternative process for preparing ultra-thin separators for various secondary batteries. Unfortunately, separators prepared from phase inversion generally suffer from uneven pore size and pore size distribution which frequently results in poor battery performance. Here, a straight forward route is demonstrated to solve the drawbacks of phase-inversion-based separators for Li-ion batteries by means of directly incorporating 2D clay sheets in the skeleton of poly(vinylidene fluoride-co-hexafl uoropropylene) (PVdF-HFP) with multiscale pore generation from a simple one-step solution coating method. Additionally generated pores by the inclusion of 2D nanosheets in PVdF-HFP skeletons combined with the multiscale pores (several micrometers+sub-micrometers) originally generated by means of the controlled phase inversion can generate additional ionic transport pathways leading to Li-ion battery performances better than those of commercialized polyethylene separators. Moreover, the addition of extremely low contents of 2D clay sheets in PVdF-HFP separators allows thermally stable polymer separators to be realized.

Biography

Jong Hyeok Park has received his PhD in Chemical Engineering from KAIST, Korea in August 2004. He has then joined University of Texas at Austin, USA as a Postdoctoral Researcher in 2004 (under Professor Allen J Bard). From March 2007 to February 2008, he worked at ETRI. He is an author and a co-author of 190 papers and 50 patents. His research focuses on organic solar cells, dye-sensitized solar cells and solar-to-hydrogen conversion devices.

anotherpark@gmail.com

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