Lithium iron phosphate (LFP) powder is the building block material of cathode of the rechargeable lithium ion batteries. LFP has received a lot of interest due to its key advantages such as thermal stability, environmental friendly and potential of low cost.

Despite these advantages, LFP suffers from low conductivity and low diffusion. Achieving small size particles and applying a carbon-coating layer commonly address these limitations. The coating also affords longer cycle life to the rechargeable batteries. However, traditional LFP carbon coating is achieved from a liquid (e.g. dissolved sugar)- or solid-phase process (e.g. co-polymer); therefore, there have been issues such as high cost, excess carbon (dead weight), non uniform layer and undesired type of the coated carbon.

We developed a gas-phase carbon coating process to coat LFP powders with a thin layer of carbon at elevated temperature (700 and 750°C) and different reaction times in a fluidized bed reactor using gaseous hydrocarbons as a carbon source.

The coating technique consisted of feeding mixture of propylene in nitrogen as carbon precursor to the preheated reactor containing fluidized LFP powder (agglomerates). Characterization of the coated LFP was achieved by XRD, SEM, TEM, XPS and LECO.

The influence of the key operating parameters was investigated. The results show that under optimal conditions, the primary particles of LFP are uniformly coated while the original structure of the LFP remained unchanged. In addition, XPS analyses reveal that a strong bond is formed between the deposited carbon and the phosphate of LFP.