Hydrogen absortion properties of nanostructured graphite-based materials for hydrogen sensor

Y. Zhang

With the development of fuel cell technologies, the detection of flammable gases such as hydrogen is an important safety issue. As a promising hydrogen sensor, milled graphite could be absorb a large amount of hydrogen. However, there is a need to understand the hydrogen sorption mechanism(s). In this work, the effect of milling conditions and additions on the microstructure and hydrogen storage properties of graphite milled in a tungsten carbide pot was investigated using TGA, mass spectrometry, XRD, SEM, TEM, Sieverts-PCT and Raman spectroscopy. The TGA and MS results showed that, for a graphite sample milled in hydrogen for 10 hours, the amount of hydrogen desorbed was about 5.6 wt%. The physical properties have been characterised by HRTEM and Raman spectroscopy as a function of milling conditions. HRTEM showed that the interlayer distance changed with milling (Fig. 1). This work discusses how the milling conditions and the type of additions (i.e. Fe), effect both the structure of the graphite samples and their hydrogen absorption properties.

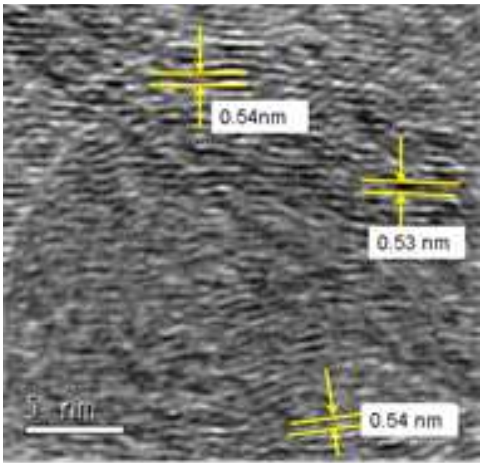

Fig.1 HRTEM image of graphite milled for 10 h in 3 bar hydrogen: the interlayer distance increased from 0.34 nm to 0.53nm

References

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