

Nanocomposites and nanomaterials

MoS₂/C nanospheres as electrode base for Li-ion power sources

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Layered molybdenum disulfide (2H-MoS₂, P63/mmc), due to the peculiarities of the crystal and electronic structure, is used today as a catalyst and lubricant [1, 2]. However, when 2H-MoS₂ is in form nanostructured materials with controlled morphology the scope of its applicability can be significantly expanded. It discovers the prospects for creation of multifunctional nanomaterials for hydrogen sensors; electrodes of lithium-ion power sources, photoelectrochemical converters and photocatalysts [3]. Additional interest is the nanocomposite materials based on graphene-like molybdenum disulfide.

In our work the possibility of application of 2H-MoS₂/C nanocomposites as a cathode basis composition for lithium power sources was studied. The nanocomposite consists of mostly spherical particles with size of near 40-70 nm composed of alternating layers of 2H-MoS₂ and carbon. The specific surface area of the synthesized material is equal to 32 m²·g⁻¹ where the major contribution part is made by micropores with average diameter of 3-7 nm. The synthesis procedure was based on the method described in [4]. The galvanostatic measurements were conducted in two-electrode cell with Li as a counter electrode in 1M LiPF₆ electrolyte and confirmed the high value of specific capacity of 4360 A·h·kg⁻¹ and specific energy of 5380 W·h·kg⁻¹ at current 0.1C and 929 A·h·kg⁻¹ and 702W·h·kg⁻¹ at 0.5C.

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