Environmental protection by recovery of lead from waste lead-acid batteries in the form of nanosized lead-oxide powders

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In the present work, we have investigated the processes with potentially reduced impact on the environment, in the recovery of lead from positive (PAM) and negative (NAM) active masses of used advanced "carbon" lead-acid batteries manufactured in Bulgaria. Desulfurization was performed in an aqueous solution of Na2CO3 (Sodium Carbonate) with a concentration of 10 or 15% at room temperature. Leaching was performed at varying temperatures (25-80o C) by adding an aqueous solution of citric acid (10 or 15%) to the desulfurized sample to obtain a lead citrate precursor.

After calcination of the precursor at low temperature (300oC) for 1 hour, nanosized lead oxide powder was formed. The chemical composition of the used active masses was determined by titration, and the negative active masses were further tested for the presence of carbon in order to utilize it. X-ray diffraction analysis (XRD) was performed at each stage of the study to monitor the changes in phase composition and crystallite size of the synthesized powders. The measured crystallite sizes of the two main phases of obtained finely dispersed lead oxide powders were 30–40 nm for beta lead oxide (β-PbO)(111) and 40–80 nm for lead (Pb).

Biography

Mariela Dimitrova completed her PhD 3 years ago at the University of Chemical Technology and Metallurgy, Bulgaria. She worked as a chemist up to 2018 in the same University. At present, she is the assistant professor of the Institute of Electrochemistry and Energy Systems, Bulgaria. She has 6 publications that have been cited 10 times, and her publication h-index is 2.

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