

Title: Preparation, optimization and application technique of recycled materials provided from electrodes of the spent car batteries

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Abstract

The invention relates to a preparation and optimization technique, namely melt queching method of new materials obtained from the recycled electrodes from spent car batteries and doping with CuO powder. New electrode materials were investigated by the analysis of X-ray diffraction and measurements of cyclic voltammetry. The X-ray patterns show diffraction peaks corresponding to the metallic lead phase with cubic structure, as main phase and traces of PbO₂ and PbO crystalline phases. The doping with 20 mol% CuO can improve the reversibility of the cyclic voltammetry, to reduce the amount of hydrogen evolution and to remove of passivation phenomena of the anodic electrode by increasing of residual current density in the potential range of 0 and 1V. Technique has the following advantages: i) the recycling of active mass of the spent electrodes by an eco-innovative, low cost and low energy consumption method; ii) the recovering of recycled materials in the environment from which they came from – like new electrodes for renewable batteries.

PURPOSE

the efficient optimization of the recycled lead from spent lead acid battery in order to new applications as electrode material.



DESCRIPTION

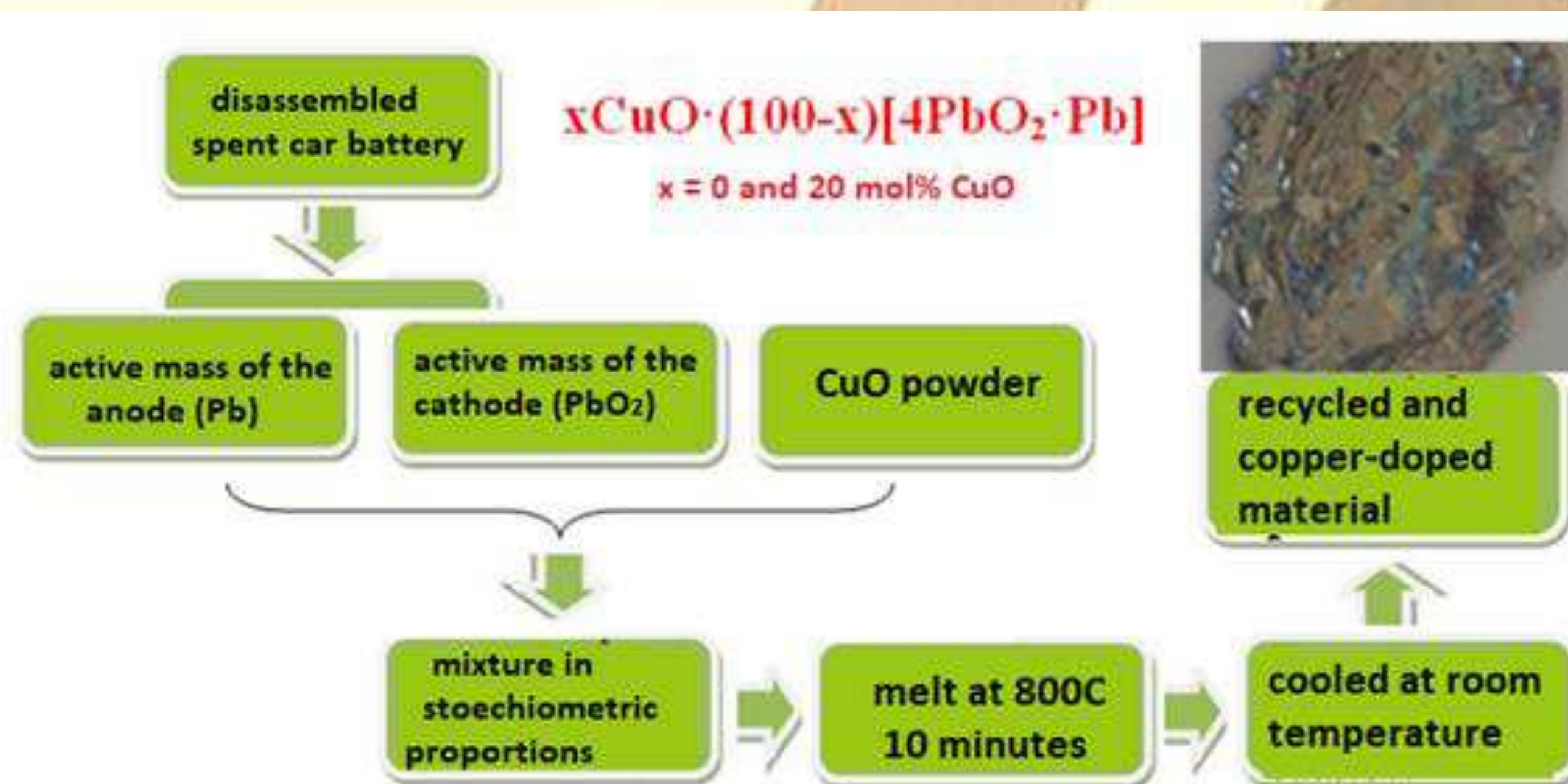


Figure 1: The preparation scheme of the recycled and copper-doped electrode materials.

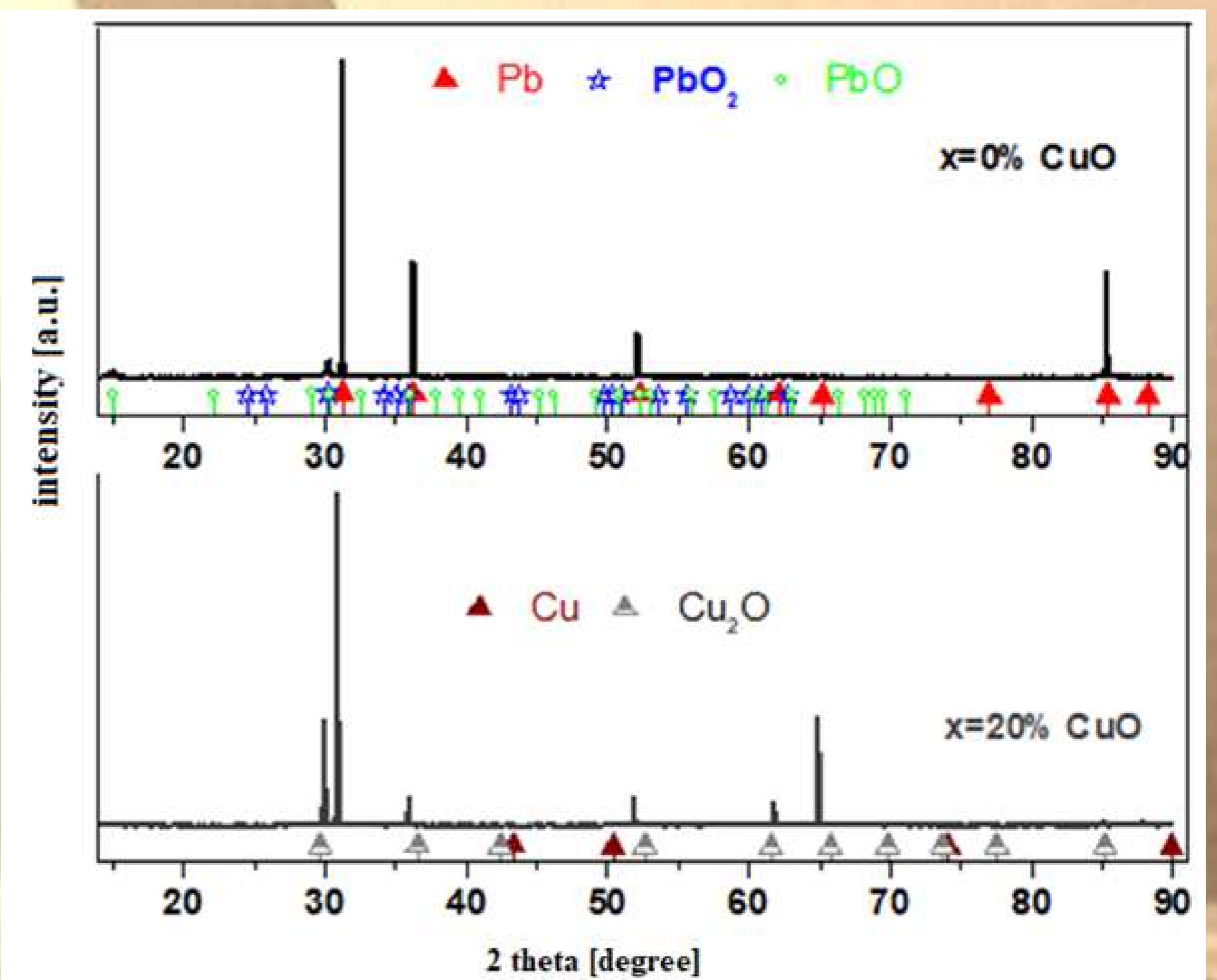


Figure 2: X-ray patterns of the recycled and copper-doped materials.

ADVANTAGES

- simple preparation method, high purity products;
- the recycled electrode and modified with cupric oxide has electrochemical performances clearly superior to the undoped electrode;
- no processes of hydrogen evolution were evidenced;
- the phenomena of anodic passivation are diminished by the doping with CuO contents (see Figure 3).
- the metallic lead (the diffraction peaks of the metallic lead phase can be observed in the Figure 2) was recycled from spent plates and optimized with 20 mol% CuO for applications as electrode material at the car batteries.

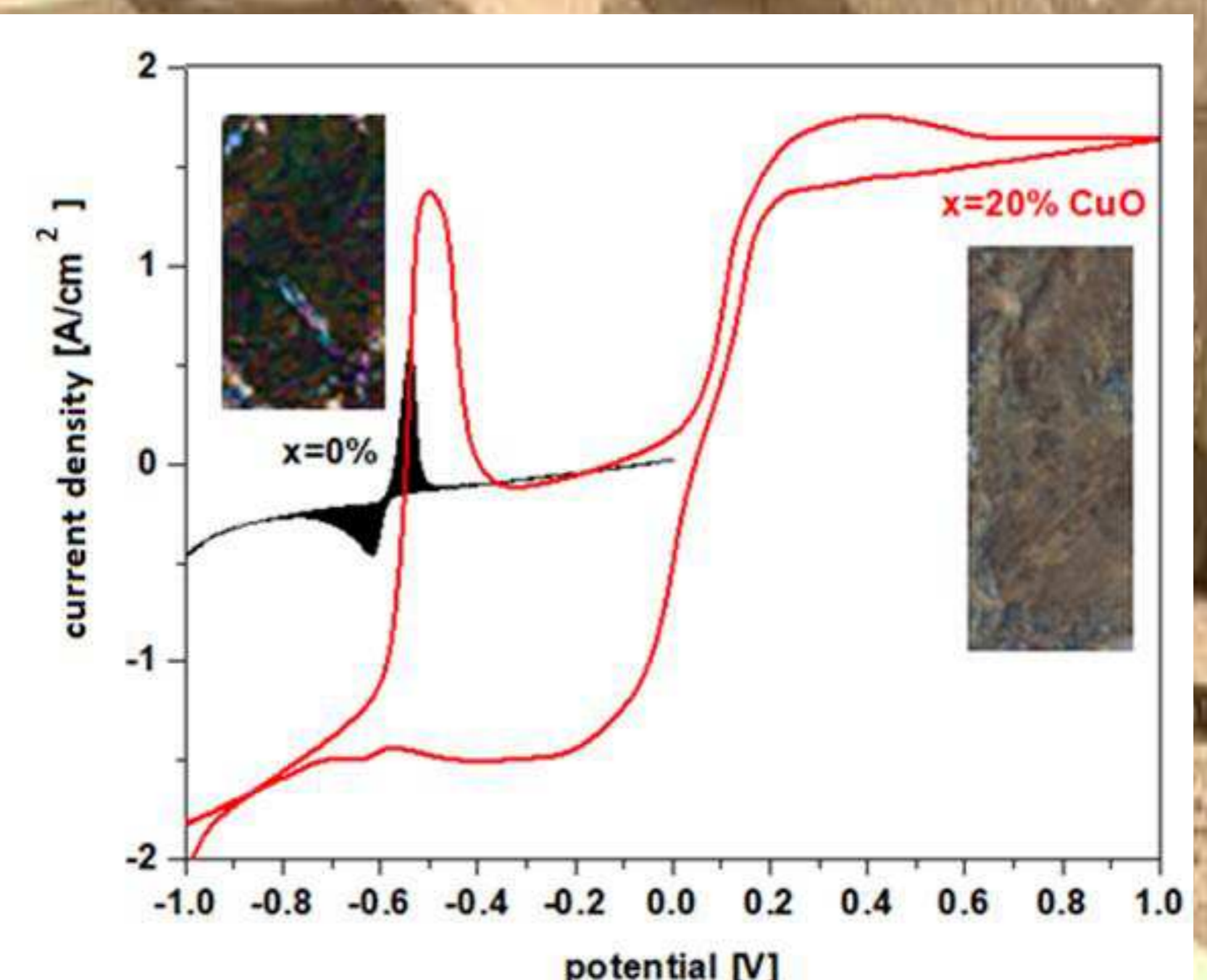


Figure 3: Cyclic voltamograms of the recycled and copper-doped materials as working electrode at a car battery.