Getting photoelectronic thin films by spin coating method of $CuBi_2O_4$

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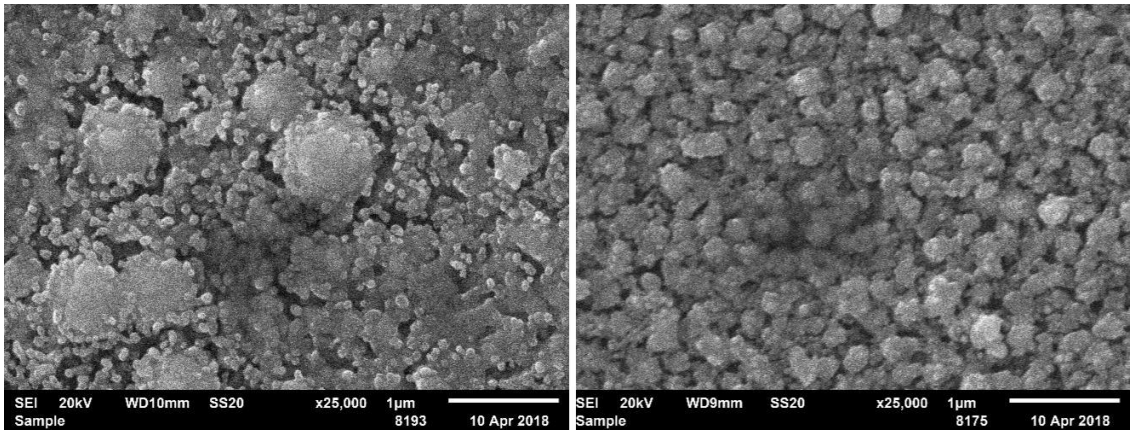
Broad use of photoelectrochemical cells (PEC) for the conversion of solar radiation and the decomposition of water with the aim of obtaining the solar hydrogen require effective, stable and relatively low-cost photoelectrode materials. One of the recently discovered photocathode materials is $CuBi_2O_4$.

The aim of this work was to obtain thin-film samples $CuBi_2O_4$ and study their properties for further application in PEC. Film deposition was carried out by spin coating method using acid solutions containing copper and bismuth salts. To obtain a denser coating by increasing the viscosity of the solution, polyethylene glycol-2000 (PEG-2000) was also added to the solution. The films were annealed at a temperature of 600 ˚C.

Research results (XRD diagrams) of all samples show that the obtained thin films have a structure of kusachiite, which corresponds to the compound of $CuBi_2O_4$. Microphotography (Fig. 26, SEM), and topographic images (AFM) allow us to conclude that the addition of PEG-2000 solution contributes to the ordering of the surface structure, which in turn has a positive effect on the photoelectrochemical properties, as shown by PEC studies. P-type of conductivity was confirmed.



a b

Fig. 26 SEM micrographs of the surface of deposited $CuBi_2O_4$ films a) without using PEG-2000; b) in the presence of PEG-2000

The new $CuBi_2O_4$ photocathode material obtained by the low-cost low-temperature spin coating method is recommended for use in photoelectrochemical processes.

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