STRUCTURAL AND OPTICAL PROPERTIES OF LAYERED AMMONIUM-IRON (II) PHOSPHATE MONOHYDRATE

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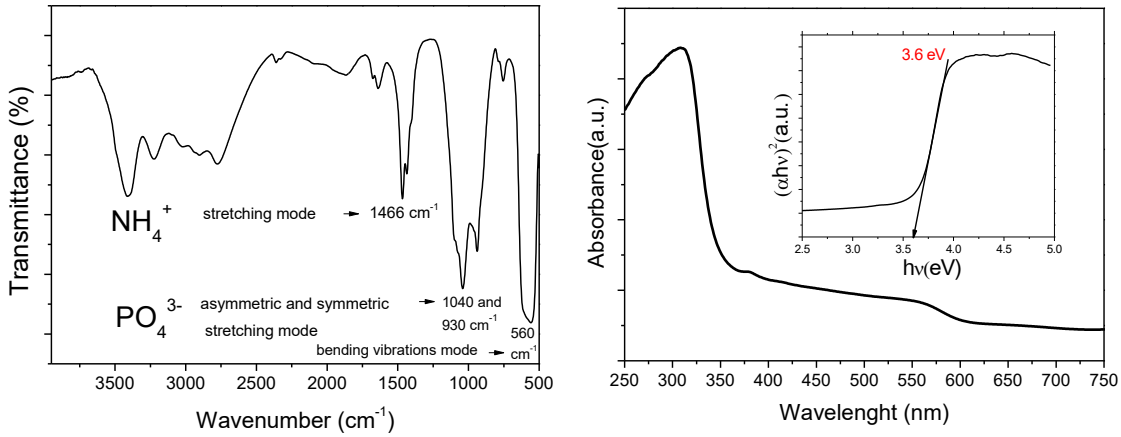
Abstract

Ammonium-iron phosphates phases have recently attracted more interest due to their promising applications as fertilizer [1] or as promising anode material for lithium-ion battery application [2], for example. In this context, $NH_4FePO_4 \cdot H_2O$ materials are obtained from $FeCl_2$, Fe_2O_3 and $NH_4H_2PO_4$ as starting reagents and NH_4OH solution by one step hydrothermal method. The factors that affect the formation processes and the product morphologies: the pH and reaction time have been analysed. The as-synthesized compounds have been characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and Fourier Transform infrared (FT-IR) spectroscopy. The optical properties of $NH_4FePO_4 \cdot H_2O$ were for the first time studied in this research work: the material displays p-type conductivity behaviour and the value for direct optical band gap E_G is estimated to be approximately ~3.6 eV. The results from this paper suggests that these phosphate materials could be suitable candidates for several applications as for example in photovoltaic technology.



FT-IR spectra (left) and optical absorption spectra (right) obtained at room temperature (insert: determination of the direct optical band gap E_G) of $NH_4FePO_4 \cdot H_2O$.

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References

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