Секция 7 Химия и химическая технология на иностранном языке (английский)

PRECISION ENGINEERING OF CsCuI CRYSTALS WITH LASER PROCESSING AND NANOPARTICLE DOPING FOR ENHANCED OPTOELECTRONIC PERFORMANCE

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Lead-free perovskites are promising materials for environmentally friendly optoelectronic devices. In this study, ambient room temperature synthesis was used to prepare CsCuI crystals by the solvent evaporation crystallization method.(Zhang et al. 2020). With the addition of Ag and Al nanoparticles we observed that it is possible to modify size, shape and color of perovskite crystals as well as Laser processing was used to modify the size, shape, and color of the crystals. An arduino-operated controlled dip coating device was used to deposit the crystals onto glass substrates. Key results included changes in color, shape, and size of the crystals after the addition of nanoparticles and laser processing. Raman peaks were observed at 120 cm^{-1}, and photoluminescence excitation was clear at 254 nm with emission at 410 nm, in agreement with the literature.(Guo et al. 2020) Transparency also changed

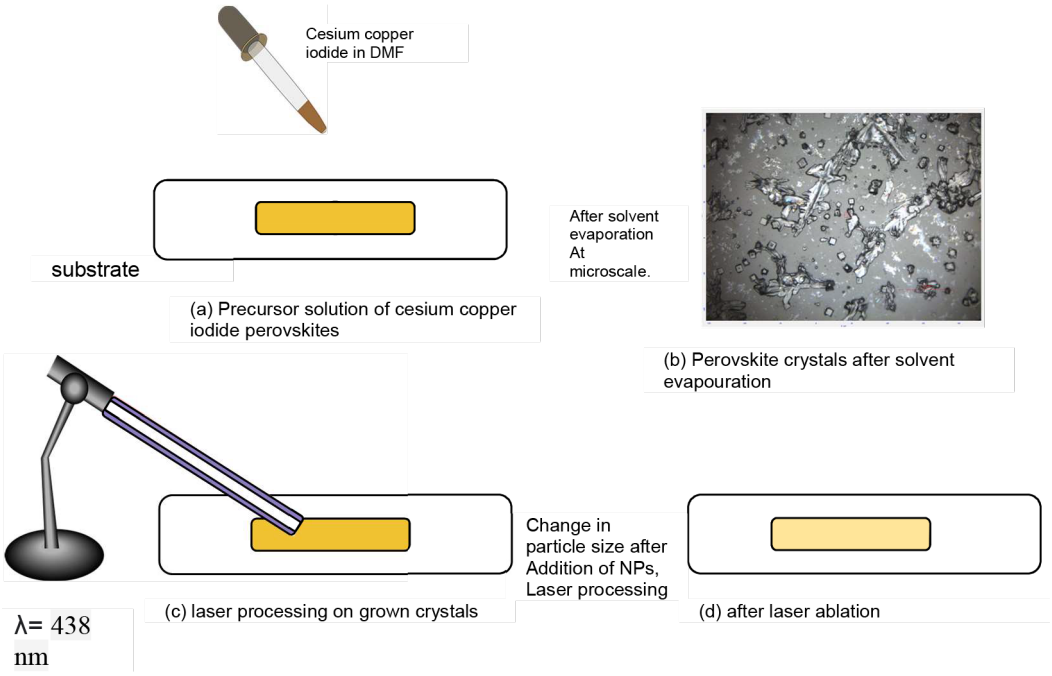

Fig. 1. *Figure Laser processing of lead free perovskites*

after laser processing because of the laser ablation process. Limitations included toxicity of the solvent, Dimethylformamide (DMF), and challenges in obtaining micrometer- and nanometer-sized crystals. Limitations included difficulty in integrating with flexible substrates such as PET (Xu et al. 2021)

In the discussion, the potential to modify the optoelectronic and PL properties of the crystals by changing their size, shape, and color was highlighted. However, the study was limited by the lack of nanometer-sized crystal growth, and future work should include AFM imaging and PL and Raman characterization of such crystals.

In conclusion, this study demonstrates the potential for modifying the properties of lead-free perovskites by adding nanoparticles and using laser processing.

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PROCESSING OF HEAVY DIESEL FRACTION ON A ZEOLITE CATALYST

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The compounds that have the most significant effect on the solidification of diesel fuel are n-paraffins. Due to the changing in the structure of paraffins, specifically their transforming into iso-paraffins, as well as other classes of organic compounds, it is possible to reduce the low-temperature characteristics of diesel fuel. Such processes can be implemented using zeolite catalysts. In addition, the technology for producing low-freezing diesel fuel on a zeolite catalyst does not require expensive metals and hydrogen-containing gas [1]. However, cracking reactions actively proceed on zeolite catalysts, which increases the yield of gaseous and light hydrocarbon non-target products. One way to reduce the yield of this kind of non-target products is to adjust the composition of the feedstock used for processing.

This work is devoted to the studying and comparison of the physical and physicochemical properties of heavy diesel fuel (boiling point is 240 °C) and products of its processing on a zeolite catalyst. For the feedstock and the resulting products, in accordance with the requirements [1], such characteristics as density, viscosity, sulfur content, cloud point (Cp), pour point (Pp), cold filter plugging point (CFPP) were determined. The results are presented in the table.

The results, which was shown in the table make it possible to judge that the processing of the heavy diesel fraction on a zeolite catalyst can significantly improve such characteristics as CFPP, cloud point, and pour point. The resulting product also contains significantly less sulfur. The density of diesel fuel does not go beyond 833.5 kg/m^3, therefore, it meets