Contribution ID: **1780** Type: **Poster**

# Electrical properties of nanoporous photo adsorbers based on CuSn(S,Se)2 under conditions of varying moisture and lighting

*Monday 28 October 2024 18:50 (20 minutes)*

Nanostructured materials based on CuSn(S,Se)2 are of interest in the context of renewable energy. They are effective photoadsorbers [1], and in addition, they have a high structural susceptibility to moisture adsorption. Thanks to the use of nanostructured photo adsorbers, it becomes possible to create a hybrid system that combines the properties of both phototransformers and converters of energy absorption of water molecules into an electric form.
The purpose of this work is to investigate the electrical properties of direct current materials in conditions of different humidity. Crystals of the composition Cu2CdGe100-XSnXSe4 were used as the investigated objects, where x = 10, 20, 30, 40, 50, 60, 70, 80, 90.

Fig. 1. Dependence of the electrical conductivity of Cu2CdGe100-XSnXSe4 samples on humidity.
As can be seen (Fig. 1), there is a tendency to decrease the electrical conductivity of the Cu2CdGe100-XSnXSe4 system with an increase in tin concentration (x%). The maximum value (0.0546 Ohm-1) was recorded for two samples x=10 and x=20 at atmospheric humidity values of 26% and 75%, respectively. It was found that the optimal humidity, where the greatest electrical conductivity is observed for most samples, is 75%.
It was found that the studied compounds of the composition Cu2CdGe100-XSnXSe4 (x=10-90) at relatively high concentrations of dopant in atmospheric humidity conditions of at least 75% have a sufficient level of electrical conductivity and can potentially be used as a functional medium for a combined chemo- and photo-converter for alternative energy sources.

Acknowledgments. The investigation was performed in the scope of the Serbia-JINR cooperation Projects № 50 2024 items 7 and 8, Serbia; Serbia-JINR cooperation Projects № 51 2024 items 4 and 5, Belarus; Serbia-JINR cooperation Projects № 130 2024 items 7 and 8.

[1] Xie H. et al. Impact of Sn (S, Se) secondary phases in Cu2ZnSn (S, Se) 4 solar cells: a chemical route for their selective removal and absorber surface passivation //ACS applied materials & interfaces. –2014. –Т. 6. –№. 15. –С. 12744-12751.

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**Session Classification:** Poster session & Welcome drinks

**Track Classification:** Applied Research