



NAZARBAYEV
UNIVERSITY



NAZARBAYEV
UNIVERSITY
LABORATORY ASTANA



Institute of
Batteries

INESS

**The 5th International Conference on
Nanomaterials and Advanced
Energy Storage Systems**

ABSTRACT BOOK



**The 4th Workshop on Water
and Soil Clean-up from
Mixed Contaminants**



Energy storage

Advanced Nanomaterials

Alternative renewable energy

Catalysis and fuel cells

Modeling tools

Environment protection

**9 - 11 August, 2017
Astana, Kazakhstan**

82.	Kenzhina J. E., Abdullin Kh., Chikhay Ye. V., Gabdullin M. T., Ismailov D. V. Synthesis of Carbon Composites and Nanocatalysts by Electrospinning Method	92
83.	Khairullina E., Panov M., Safonov S., Logunov L., Kochemirovsky V. Non-Enzymatic Glucose and Hydrogen Peroxide Sensors Based on Metal Structures Produced by Laser-Induced Deposition from Solution.	93
84.	Kim E. R., Keldinova A. B., Gritsenko L. V., Abdullin Kh. A., Kumekov S. E. Thermal Treatment of Aluminum Doped Zinc Oxide Thin Films	94
85.	Kim E. R., Ualikhanov R. E., Ucbassova D. T., Gritsenko L. V., Guseinov N. R., Abdullin Kh. A. Photosensitivity of Nanostructured CdS Layers, Synthesized by Hydrothermal Route	95
86.	Kozlovskiy A., Kaikanov M., Tikhonov A., Ponomarev D. Synthesis and Modification of Ni-nanotubes by Electron Radiation	96
87.	Nurdillayeva R. N., Horrocks B. R. and Pike A. R. Electronic and Electrochemical Characterization of DNA - templated CdS nanowires	97
88.	Omirkbekov D. B., Zhunisbekov A. T., Ramazanov T. S., Orazbayev S. A., Dosbolayev M. K., Gabdullin M. T., Zhumadylov R. E. Obtaining of Carbon Nanoparticles in Combined RF/DC Discharge Plasma	98
89.	Puzikova D. S., Khussurova G. M. The Influence of Counterelectrode Material on Photocurrent Generation in Polysulfide Electrolyte	99
90.	Puzikova D. S., Dergacheva M. B., Khussurova G. M. Photoelectrochemical Cell with Modified CdSe Photoanodes	100
91.	Ryaguzov A. P., Nemkayeva R. R., Guseinov N. R. Effect of Sn Nanoparticles on Optical Properties of HDLC Films	101
92.	Sarsenov A. M., Myrzakhmet M. K., Baitassova Zh. Y. New Express Method for the Activity of Solvent Molecules Determining in Electrolyte Solutions	102
93.	Sarsenov A. M., Sarsenova M. A., Myrzakhmet M. K., Sataeva G. E., Bekmukhanbetova D. B., Baitassova Zh. Y. Dosing of Nano-Microcomponents of Hardly Soluble Substances in Water	103
94.	Serikbaev B. A., Kamysbaev D. Kh., Arbuz G. S. Sorbents Based on Rice Husk for the Synthesis of Modified Electrodes	104
95.	Shalabayev Zh. S., Madikassimova M. S., Tatykayev B. B., Uralbekov B. M., Burkitbayev M. M., Urakaev F. Kh. Synthesis of CuS/S Nanocomposites and Their Application Fields	105
96.	Sherahan A., Belgibayeva D. S., Nurpeisova D. T., Smagulova A. Size-Controlled Synthesis of Iron Nanoparticles in Aprotic Polar Solvents	106
97.	Shomanov A. S., Yessenbayev Z. A., Matkarimov B. T., Beketayev K. B. Design and Simulation of a New Coaxial Probe for NSOM	107
98.	Talamona D. and Tan K. H. Green Concrete using Recycled Aggregate Concrete for Sustainable Construction	108
99.	Tatykayev B. B., Shalabayev Zh. S., Uralbekov B. M., Burkitbayev M. M., Urakaev F. Kh. Photocatalytic Activity of Solid-State Synthesized Associate Nanocrystalline AgCl@Ag	109
100.	Urakaev F. Kh., Abuyeva B. B., Vorobyeva N. A., Mun G. A., Uralbekov B. M., Zharlykasivova D. N., Burkitbayev M. M. Nanosulfur in the Water-Soluble Polymers: Synthesis and Application	110
101.	Urazov K. A., Zaretskaya E. P., Gremenok V. F. Electrodeposition-Annealing Process for Preparation $Cu_2ZnSn(S_2Se_{1-x})_4$ Thin Films.	111
102.	Urazov K., Dergacheva M., Gremenok V., Stanchik A., Bashkirov S. Photocharacteristics of Electrodeposited CZTSe Thin Films on Different Substrates	112
103.	Batrvshev D. G., Yerlanuly Ye., Ramazanov T. S., Dosbolayev M. K., Gabdullin M. T. Obtaining of Carbon Nanowalls by PECVD Method in the Plasma of Radio-Frequency Discharge	113
104.	Yermekova A., Tulebaeva D. Synthesis of Nanostructures Based on Ferrum Oxide	114
105.	Kudyarova Zh. B., Yerpaiyz B.D., Mironenko A. V., Kazieva B. A., Mansurov Z. A. Catalysts for Dimethyl Ether Synthesis	115
106.	Zhakiyev N., Sovetov M., Otarov R., Kopanos G. Techno-Economic Analysis of Renewable Power Plant Expansion Considering Provision of Curtailment from Combined Heat and Power (CHP) Plant and Electricity Storage	116
	4th Workshop on Water and Soil Clean-up from Mixed Contaminants	
107.	Václavíková M. WaSClean - Water and soil clean-up from mixed contaminants	118



Synthesis of CuS/S Nanocomposites and Their Application Fields

Shalabayev Zh. S.^{1,*}, Madikassimova M. S.¹, Tatykayev B. B.¹, Uralbekov B. M.¹,
Burkitbayev M. M.¹, Urakaev F. Kh.²

¹Al-Farabi Kazakh National University, al-Farabi av. 71, Almaty 050040, Kazakhstan

²Sobolev Institute of Geology and Mineralogy SB RAS, acad. Koptyug av. 3, Novosibirsk 630090, Russia

E-mail: zhandos.shalabay@gmail.com

Copper sulfide and sulfur nanoparticles have many application fields in industry and technology^{1, 2}. Nowadays, copper sulfide and sulfur nanocomposites can be used as a semiconductor in electrochemistry, photocatalyst in catalysis and in battery technology^{2, 3}. In this report, nanocomposites of CuS@S were co-precipitated via the reaction $\text{Na}_2\text{S}_n + \text{CuSO}_4 \rightarrow \text{CuS} + \text{S} + \text{Na}_2\text{SO}_4$. Obtained black precipitate was separated, washed and dried for the further analyses. X-ray powder diffraction analysis (D8 ADVANCE, Bruker) was used for characterization morphology and composition of obtained nanocomposite. X-ray data showed that the sample contained two phases: CuS and S₈ (orthorhombic, Space Group Fddd, no. 70), see Figure 1. According to the semi-quantitative analysis, chemical composition of sample was 67.9% CuS and 32.0% S₈. Copper sulphide had a hexagonal crystal lattice and sulfur was well crystallized. The crystallite size of CuS and S₈ were 22.4 nm and 54.6 nm respectively.

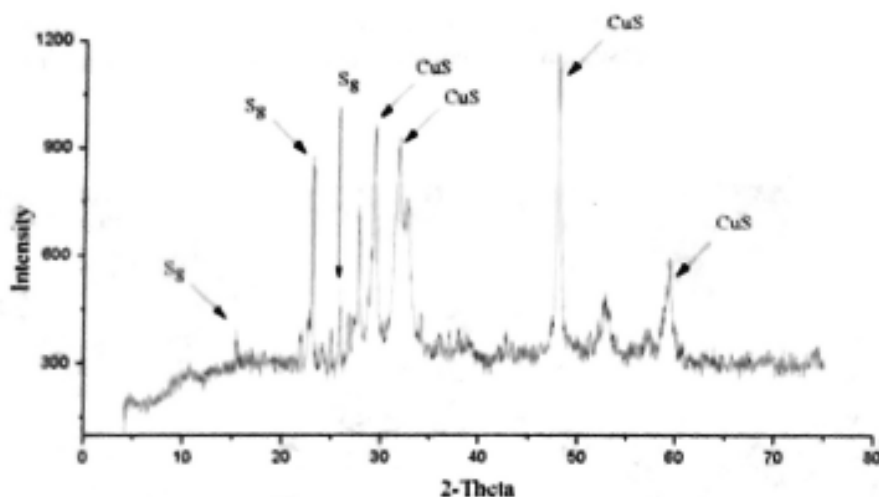


Fig. 1. XRD pattern of CuS/S nanocomposite.

References

- [1] Goel S, Chen F., Cai W. Synthesis and biomedical applications of copper sulfide nanoparticles: From sensors to theranostics (*Review*) // *Small*. 2014, **10**(4), 631-645.
- [2] Roy P., Srivastava S.K. Nanostructured copper sulfides: synthesis, properties and applications // *CrystEngComm* 2015, **17**(41), 7801-7815.
- [3] Kolny-Olesiak J., Parisi J. Colloidal copper sulphide based nanocrystals as building blocks for self-assembled nanostructures // *Springer Series in Materials Science*. 2015, **217**, 177-193.
- [4] The work is supported by the funding program 0130/PTsF-14 of the RK.



Katsuhiko T.	49	Mukhanov Anuarbek	50
Kaydar B.	20	Myronov Maksym	19, 69
Kazieva B.A	115	Nakamura H.	43
Keldinova. A.B	94	Nazhipkyzy M	71
Kenzhegaliyeva Elzira	63	Nemkayeva R.R.	101
Kenzhina I.E	91, 92	Noyanbayev Nurym	36
Kerimray Aiyngul	47	Nugent Liam	124
Khairullina E.	93	Nuraje Nurxat	53
Kholkin.A. L	28, 74,	Nurakhmetov D.	44
Khussurova G.M	99, 100	Nurdillayeva Raushan	97
Kim E.R.	94, 95	Nurgain A	71
Kiselev E. A.	64	Nurpeisova D.T	106
Kochemirovsky Vladimir	93	Nurpeissova A.	32, 35, 56, 58, 69, 70, 73
Kolotygin V. A.	54	Okube Maki	39
Kopanos Giorgos	116	Omirbekov D.B	98
Koshkina A. A.	28, 64	Orazbayev S.A.	98
Kosova Nina V.	16, 26, 75	Otarov Rustam	41
Kotuč Juraj	128	Otarov Rustam	116
Kozlovskiy A.	85, 96	Pannala Ananth S.	123
Krtil Petr	39	Panov Maxim	93
Krulakova Maria	129	Pavlenko, V.	34, 89
Krupa Vitazoslav	129	Pelegov D. V.	28, 30, 64, 74
Kudreeva L	88	PEPONIDOU Evgenia	120
Kudreyeva. L	89	Pereira-Ramos J-P.	12
Kudyarova Zh.B	115	Petrykin V.	39, 43
Kulametov Zhalgas	65, 66, 68	Podgornova O	75
Kumekov.S.E.	94	Ponomarev D.	96
Kupka Daniel	119, 121	Poulopoulos Stavros	47
Kurbatov A	34, 81, 84, 89	Presniakov Igor A.	33
Kurmanbayeva Indira	66, 67, 68	Prikhodko N.	34, 71
Kuznetsov.D. K.	28, 74,	Pryakhina V. I.	28, 64, 74
Labas Milan	129	Puzikova D	99, 100
Lazarova Edita	129	Radchik Alex	25
Lee S.	43	Rakhimzhanova. M	61
Lesbayev B	71	Ramazanov T.S.	98, 113
Liam Nugent	124	Rezepova Daria	26
Lim J.S.H.	49	Romanuyk K. N.	30
Litasov Konstantin	77	Ryaguzov A.P.	101
Logunov Lev	93	Rysbekova A	80
Lu Maxim	42	Sadykova. A	66
Ma Xiaodi	24	Safonov Sergey	93
Macounva Katerina	39	Sanbayeva	62, 126, 127
Makhmutov. A. R.	28, 74	(Muzdubayeva) Ayana	
Kuncelbayev M.	130	Sandeman Susan	124
Mansurov Z.A.	16, 20, 34, 115	Sarbassov Yerbol	47
Matkarimov B.T.	107	Sarker Dipak K.	123
Mentbayeva Almagul	57, 58, 59, 60, 65, 68, 122	Savina I.	125
Mergaliyev Duisen	51	Sazonov. R	61
Mikhailovska L.	125	Seitov A	55
Mikhailovsky Sergey	123, 124, 125	Sekula Peter	122, 128
Mironenko A.V	115	Sekula Peter	121, 122, 128
Molkenova A.	27, 29, 35, 59, 61, 62, 63, 69, 73	Sekula Peter jr	121
Mosej Juraj	121, 122	Sergiienko S.A.	54
Mukanova Aliya	35, 69, 73	Serikbaev Bazarbay	90, 104
Mukanova Zhansaya	65	Shabdan Yerkin	53
Mukhambetov D.G	85	Shalabayev Zh.S	105, 109
Mun G.A.	109		
Munakata Hirokazu	11, 13		