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**FACULTY OF  
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# WV INTERNATIONAL CONGRESS

## V ENGINEERING, ENVIRONMENT AND MATERIALS IN PROCESS INDUSTRY EEM2023

### BOOK OF ABSTRACTS



JAHORINA  
MARCH 20-23, 2023

REPUBLIC OF SRPSKA  
BOSNIA AND HERZEGOVINA

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# **VIII INTERNATIONAL CONGRESS**

***ENGINEERING, ENVIRONMENT AND MATERIALS IN  
PROCESS INDUSTRY***

***EEM2023***

**UNDER THE AUSPICES OF  
MINISTRY OF ECONOMY AND ENTREPRENEURSHIP OF THE REPUBLIC OF  
SRPSKA**

**AND**

**ACADEMY OF SCIENCES AND ARTS OF THE REPUBLIC OF SRPSKA**

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## STUDY OF THE EFFECTS OF ACTIVE BROMINE SPECIES PRESENCE IN ELECTROLYTIC DESULFURIZATION OF SUBBITUMINOUS COAL

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### Abstract

*The removal of organic and inorganic sulfur from the Bogovina Basin subbituminous coal by electrochemical redox reactions was performed. The effect of presence of active bromine species on the desulfurization process was monitored. The desulfurization was performed in inorganic acidic solutions that contained different bromide concentrations and in pure acid solution. To determine the optimal conditions for the desulfurization process, polarization curves were recorded in three different electrolytes: 0.1 M H<sub>2</sub>SO<sub>4</sub>, 0.1 M H<sub>2</sub>SO<sub>4</sub> + 0.01 M KBr, and 0.1 M H<sub>2</sub>SO<sub>4</sub> + 0.1 M KBr using graphite and dimensionally stable anode (DSA) electrodes as the anode, while in all cases stainless steel S31603 electrode was used as cathode. By analyzing the results obtained from the polarization curves, 0.1 M H<sub>2</sub>SO<sub>4</sub> and 0.1 M H<sub>2</sub>SO<sub>4</sub> + 0.1 M KBr were chosen as the most suitable electrolytes. Also, it was found that the DSA anode showed better results in terms of energy efficiency of the process compared to the graphite anode and therefore it was selected for the coal desulfurization process. It is considered that finely suspended coal particles in an electrolyte can behave according to bipolar electrochemistry. Coal was treated for 4 hours in two selected electrolytes. The suspension was sampled at different times up to 240 min from the beginning of the process. Sulfur content in coal was determined by elemental analysis. The results showed that the sulfur content decreases faster in the case of the electrolyte containing KBr, i.e. that the desulfurization effect is significantly better than in the case of the system containing only H<sub>2</sub>SO<sub>4</sub>. It can be concluded that active bromine species accelerate the desulfurization process and thus improve energy efficiency.*

**Key words:** subbituminous coal; oxidative desulfurization; organic sulfur; active bromine species; electrolytic desulfurization; DSA