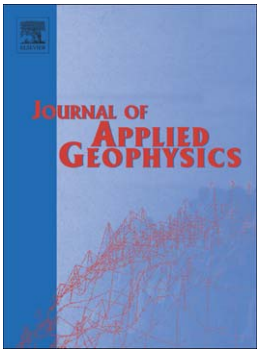

Study on the characteristics of coal rock electromagnetic radiation (EMR) and the main influencing factors

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PII: S0926-9851(17)30406-8
DOI: doi:10.1016/j.jappgeo.2017.11.018
Reference: APPGEO 3380

To appear in: *Journal of Applied Geophysics*

Received date: 24 April 2017
Revised date: 6 September 2017
Accepted date: 27 November 2017

Please cite this article as: Li, Xuelong, Study on the characteristics of coal rock electromagnetic radiation (EMR) and the main influencing factors, *Journal of Applied Geophysics* (2017), doi:10.1016/j.jappgeo.2017.11.018

Study on the Characteristics of Coal Rock Electromagnetic Radiation (EMR) and the Main Influencing Factors

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Abstract: Coal rock would produce electromagnetic radiation (EMR) in the loading process, but study on the influence factors influence on the coal rock EMR characteristics in the mesoscopic level is not insufficient. In the paper, the EMR characteristics of coal and rock samples under uniaxial loading are studied. Several typical microcosmic mechanisms affecting the characteristics of EMR are discussed, such as strength, composition and microstructure of the samples. Results show that the macroscopic structure of the outburst coal is soft, the corresponding EMR signal increases slowly with the loading increase and the EMR peak is smaller. The rockburst coal has a strong brittleness, the EMR signal increases quickly and EMR peak appears while the coal breaks is larger than the outburst coal. The EMR characteristics of rock samples are similar to the rockburst coal, but the EMR peak is the largest. When the coal rock microstructure is complete, the coal rock block is larger and the brittleness is stronger, then the corresponding strength would be larger. And the free charge generated by thermal excitation, field emission and intergranular chemical bond breakage would also be more. In the meantime, the crack propagation rate becomes greater, therefore the EMR is more stronger. The piezoelectric effect is mainly caused by the linear elastic stage of the specimen deformation and rupture, which contributes less to the EMR signals. This study is of great theoretical and practical value for assessing the mechanical state of coal rock through EMR technology, and accurately monitoring and predicting the coal rock dynamic disasters.

Key words: coal rock; electromagnetic radiation; microstructure; piezoelectric effect