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The research of the response mechanism: Microstructure and thermoelectricity of nano - micro pyrite prepared by thermal sulfidation

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Pyrite is extremely abundant in the earth's crust and distributed very widely. Due to the particularity of it, pyrite is an important research subject in several different fields such as gold prospecting, metallogenic environment, metallogenic prediction, and even functional material. Studies have shown that different Fe/S atom ratio, impurity, and temperature, could all cause crystal defects in the crystal interior, which could lead to the occurrence of crystal lattice structure distortion, which then could affect the thermoelectricity of pyrite. Thus, there might exist a response relationship between the mineral crystal structure and thermoelectricity. However, presently, the research on the relation between the response researches is still rare. In this paper, the samples were obtained by thermal sulfidation during 320~420°C and studied using a SEM, a XRD and thermoelectricity instrument respectively, to study the crystal morphology, structure and thermoelectricity. The research shows that: (1) Pyrite prepared by thermal sulfidation, are p-type with a small scope of thermoelectric coefficient and good stability. (2) The value of the thermoelectric coefficient was correlated with the growth degree of crystal planes, the higher degree of crystallinity, the higher thermoelectric coefficient. (3) There exists a significantly different influence from different directions on the thermoelectric coefficient; the thermoelectric coefficient of low-index surface (111), (200) and (210) was significantly greater than high-index surface (220) and (311). (4) In the pyrite crystal, the different reticular density caused different thermoelectric. The greater the reticular density, the greater is the influence on the thermoelectric coefficient.

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