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Thermomagnetic Component Measurement (TCM) : A New Method for Mineral Exploration in Coverage Areas

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As a new method for concealed mineral deposits exploration, TCM can strengthen the weak mineralization information, mainly applied in coverage regions where conventional geochemical exploration methods are not effective. With the good stability and abnormal reproducibility, TCM can intensify weak mineralization information caused by deep ore body and achieve the purpose of strengthening the anomalies making sense to the ore-body instruction. Previous research showed that TCM for concealed mineral deposits exploration in drought, semi-arid and semi-humid landscape area is effective.

The research on the mineralogical features, chemical analysis, the enrichment form of indicator elements, and the demonstration application provides the theoretic bases of the TCM. Author obtained following main achievements. (1) Magnetic crystalline Fe-Mn oxides that is transformed by the noncrystalline Fe-Mn oxides is the predominant ingredient in thermomagnetic component, which exist in forms of single grain or particle aggregates. (2) The correlative analysis between Fe-Mn oxides and mineralized indicator elements of soil, thermomagnetic component and nonmagnetic components confirms the enrichment of thermomagnetic component on the mineralization indicator elements. (3) Based on the contrast analysis of the characteristic statistical parameters and geochemical anomalies, the results illustrates that whether from the point of the anomaly intensity or the anomaly size, the effectiveness of TCM is more remarkable than soil measurement. And more importantly, TCM is more powerful in detecting the weak mineral information, showing the application prospect in coverage areas. (4) The statistical analysis used in the interpretation and evaluation of geochemical anomaly in TCM can better recognize the characteristics of the geochemical elements on the whole, and the relationship of the geochemical information can be figured out in geochemical thermomagnetic component, which provide more reliable foundation for strengthening the anomaly with profound senses. (5) Metal particles such as Au and Ag and Zn and W, etc which size range nano to micro are observed by SEM in micropore space of thermomagnetic component. This discovery provides a microscopic evidence for the mechanism research of thermomagnetic component measurement.

According to the previous experimental results obtained, TCM has the ability to find deep mineralization information in coverage areas. As a new method for concealed mineral deposits exploration, TCM would provide effective technical means to promote mineral exploration in coverage areas.

