Geochemical characteristics of the Mashan Au-S Deposit in Tongling, Anhui Province

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The Tongguanshan copper field in Tongling, Anhui, is one of the typical skarn orefields in the middle-lower Yangtze Valley iron, copper, sulfur and gold metallogenic belt of China. The Mashan Au-S deposit located in the Tongguanshan field is related to the Tian'ebaotanshan quartz diorite. A lot of research work has been done in such aspects as mineral deposit, mineralogy, tectonics, isotope geochemistry and fluid inclusions. Based on the work done, this paper deals mainly with hydrogen, oxygen, carbon, sulfur, silicon isotopic compositions and REE geochemistry of the Mashan Au-S deposit.

The results show that chondrite-normalized REE patterns are right-inclined, and the REE distribution patterns for ores are similar to those of the Tian'ebaotanshan quartz diorite, which indicates that the hydrothermal fluids of the deposit were mainly derived from dioritic melt. The O isotopic compositions of quartzes in ore range from 6.9‰~10.7‰ with the average of 8.7‰, which are approximate to those of the pluton (9.3‰~11.1‰, with the average of 10.0‰). Together with the D isotopic compositions of quartzes in ore (-69‰~-62‰), it shows that the metallogenic fluids were mainly derived from magmatism. The C and O isotopic compositions of calcites in ore are different from those of country rocks in the orefield. The C and O isotopic compositions range from -5.2‰~-3.6‰ and 12.2‰~12.9‰, respectively, which are similar to the C and O isotopic compositions of magmatism. Therefore, C and O in ores might have come from magmatism. Silicon and sulfur isotopes are quite similar to those in magma or magmatic hydrothermal solutions.

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The origin and evolution of dust in the interstellar medium

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At the end of their life, stars return most of their material back to the interstellar medium. This material undergoes a complex evolution in the interstellar medium before it becomes part of the next generation of stars and planets. Small dust grains condense in the ejecta of stars as it cools because of expansion. Astronomical observations and analysis of stardust isolated from meteorites have revealed a highly diverse interstellar and circumstellar grain inventory, reflecting the varied physical and chemical conditions in their birthsites. This talk will review this dust inventory contrasting and comparing both the interstellar and circumstellar reservoirs as also the astronomical and meteoritic evidence.

Interstellar dust is highly processed during its sojourn from its birthsite (stellar outflows and explosions) to its incorporation into protoplanetary systems. Of particular importance is processing by cosmic rays in the interstellar medium and by strong shocks due to supernova explosions. The latter leads to rapid destruction due to sputtering by impacting gas ions and shattering due to grain-grain collisions. We will review theoretical calculations describing these processes and the astronomical and meteoritical evidence for their importance.