

The biological accumulation of metallic nanoparticles and its prospecting significance

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Recently, the existence of nanoparticles in the organisms gained high attention gradually. In our work, some invertebrate samples (ie, earthworms, ants and spiders) and plant samples (ie, loquat leaf, chinaberry leaf, banyan leaf and stem) were collected on the ground surface of several concealed metallic deposits. High-resolution transmission electron microscopy (TEM) was used for observing the characteristics of nanoparticles contained in these samples. It is easily found that almost all of the chosen organisms can efficiently accumulate the nanoparticles within their bodies and these nanoparticles always comprise corresponding ore-forming elements of concealed metallic deposits (metallic nanoparticles). Two forms can be identified about the accumulation phenomenon of nanoparticles. One form is the nanoparticle aggregation that composed by several smaller nanoparticles, while the other form is the concentrated distribution of many single nanoparticles. Furthermore, the nanoparticles in the same aggregation or in the adjacent positions usually have similar chemical compositions.

In addition, biological accumulation of metallic nanoparticles enables the organisms to function as natural collectors and accumulate several times the geochemical anomaly indicators of their external environment, which is extremely profitable to the detection of mineralization anomalies. Especially for deep-seated concealed deposits with little anomaly shown in the surface cover, the accumulation and concentration of geochemical anomaly indicators are particularly important.

In conclusion, biological accumulation phenomenon of metallic nanoparticles is ubiquitous in the surficial organisms above concealed metallic deposits, which would provide the advantages of organism medium over than other media in the blind ore prospecting.

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