Fluorescence spectrum characteristic of the extractable humus in soil from Shannan developed area

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Humus is a kind of amorphous, brown or brownish black, hydrophilic, acidic, polydispersed organic matter and more dispersed widely in soil, sediment, and water (such as lakes, rivers, oceans and groundwater, etc.). It is not only a major source of soil nutrients but also has a significant impact to physical, chemical and biological properties of soil, it is one of the indicators of soil fertility.

Contents of extracted humus in soil planted with different crops were determined, and the fluorescence spectra features of extracted humus in the same sampling point in different soil layers were analyzed. The results showed that contents of extracted humus in soil planted with different crops are different, there is no obvious rule. For different soil layers of the same sampling point, the distribution of extracted humus is not the same, mostly show that: the surface (0~20cm)> the middle (40~60cm)> the lower (80~100cm). The excited state fluorescence spectra of extracted humus in soil of different land types have similar fluorescence characteristics, peak obvious presents in about 390nm and 455nm. The fluorescence emission spectra are all broadband peak without obvious features. emission wavelength is about 500nm.The stimulate spectra of extractable humus in cotton soils has two distinct peaks around 445nm and 460nm, with the deepening of soil the two peaks separate more obviously. And extractable humus in surface layer, middle layer and lower layer has inspired fluorescence peak in 503nm, 498nm and 492nm in turn, peak type is moderate, and along with the increase of soil depth, fluorescence intensity greatly increase.

Geochemical and U-Pb age constraints on the occurrence of polygenetic titanites in UHP metagranite in the Dabie orogen

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Accessory minerals such as zircon and titanite are common in continental subduction-zone metamorphic rocks, and time and process of their formation can be dated by the U-Pb method and geochemical tracers. This is a great advantage to identify their genesis with respect to the origin of host rocks. Magmatic titanite was identified in the core of a few titanite grains with the overgrown rim of metamorphic titanite in UHP metagranite in the Dabie orogen. LA-ICPMS U-Pb dating gave Neoproterozoic ages for the magmatic titanite but Triassic ages for the metamorphic titanite. The magmatic and metamorphic titanites are clearly distincted by differences in petrological and geochemical compositions. The magmatic titanite occurs as residual cores that show bright BSE, the presence of allanite and quartz inclusions, low contents of CaO, Al_2O_3 and TiO_2 but high contents of Fe_2O_3 and MgO. In trace elements, the magmatic titanite exhibits high REE and HFSE contents, distinctly negative Eu anomalies with flat MREE-HREE patterns, and high Th/U ratios. In contrast, the metamorphic titanite occurs as rims and grains of homogeneously dark BSE that contain inclusions of epidote, quartz, K-feldspar, rutile, biotite and phengite, and have relatively high contents of CaO, Al_2O_3 and TiO_2, but low contents of Fe_2O_3 and MgO, and relatively low REE and HFSE contents, slightly negative Eu anomalies with HREE depletion relative to MREE, and low Th/U ratios. The Zr-in-titanite thermometry yields 727 to 877°C at 0.5 to 1.0 GPa for the magmatic titanite, and 729 to 870°C at 1.5 to 2.0 GPa for the metamorphic titanite. The Neoproterozoic U-Pb chronometric system of magmatic titanite survived the Triassic continental subduction-zone HP-UHP metamorphism. This suggests a relatively high closure temperature of >800°C for the titanite U-Pb system. The metamorphic titanite is principally a product of retrograde metamorphism during decompression exhumation at the transition from HP eclogite-facies to amphibolite-facies. Therefore, titanite holds a great potential to petrology and geochemistry of continental subduction-zone processes.