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磁铁矿和钛铁矿成分对四川太和富磷灰石钒钛磁铁矿床成因的约束

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摘要：

产于层状镁铁质-超镁铁质岩体中的太和岩浆型Fe-Ti氧化物矿床是峨眉山大火成岩省内带几个超大型Fe-Ti氧化物矿床之一。太和岩体长超过3km，宽2km，厚约1.2km。根据矿物含量和结构等特征，整个岩体从下向上可划分为下部岩相带、中部岩相带、上部岩相带。下部岩相带主要以（橄榄）辉长岩和厚层不含磷灰石的块状Fe-Ti氧化物矿层组成。中部岩相带韵律旋回发育，（磷灰石）磁铁辉石岩主要位于旋回的底部，旋回上部为（磷灰石）辉长岩。上部岩相带主要是贫Fe-Ti氧化物的磷灰石辉长岩。太和中部岩相带磷灰石磁铁辉石岩含有5%~12%磷灰石、20%~35% Fe-Ti氧化物、50%~60%硅酸盐矿物，且硅酸盐矿物与磷灰石呈堆积结构。磷灰石磁铁辉石岩中磁铁矿显示高TiO_2、FeO、MnO、MgO，且变化范围与趋势接近于攀枝花岩体。钛铁矿FeO分别与TiO_2、MgO显示负相关，而FeO分别与Fe_2O_3、MnO显示正的相关，且TiO_2、FeO、MnO、MgO含量变化较大，这些特征都暗示磁铁矿和钛铁矿是从富Fe-Ti-P岩浆中分离结晶。因此，可以推断太和磷灰石磁铁矿辉石岩形成于矿物重力分选和堆积。太和下部岩相带包裹在橄榄石中磁铁矿含有相对较高Cr_2O_3（0.07%~0.21%），而中部岩相带包裹在橄榄石中磁铁矿Cr_2O_3（0.00%~0.03%）显著降低，且这些磁铁矿Cr_2O_3含量变化与单斜辉石Cr含量和斜长石An牌号呈正相关。这些特征印证了形成中部岩相带的相对演化的富Fe-Ti-P母岩浆可能是源自中部岩浆房的混合岩浆。上部岩相带磁铁矿和中部岩相带顶部少量磁铁矿显示较低Ti+V可能是由于岩浆房中累积的岩浆热液对磁铁矿成分进行了改造。

英文摘要：

The ~260Ma Taihe layered intrusion is one of the mafic-ultramafic intrusions host giant magmatic Fe-Ti oxide ore deposit in the central Emeishan Large Igneous Province. It outcrops ~3km long and ~2km wide, and has a thickness of ~1.2km. According to mineral assemblages and petrography textures, the intrusion can be divided into three lithologic zones: Lower Zone (LZ), Middle Zone (MZ) and Upper Zone (UZ). The LZ comprises (olivine) gabbros and thick massive Fe-Ti oxide ores. The MZ consists of six cyclic units, which are comprised of (apatite) magnetite clinopyroxenites and (apatite) gabbros from the base to the top. The UZ is comprised of Fe-Ti oxide-poor apatite gabbros. The apatite magnetite clinopyroxenites of the Taihe MZ contain 5%~12% apatite, 20%~35% Fe-Ti oxides and 50%~60% silicates which occur as cumulus phases together with apatite. The magnetite compositions of the apatite magnetite clinopyroxenites are characterized by high TiO_2, FeO, MnO and MgO contents and its variations are similar to those of the Panzhihua intrusion. Meanwhile, the ilmenite compositions display the negative correlations between FeO and TiO_2 and MgO, respectively. The FeO of ilmenite is positively correlated to Fe_2O_3 and MnO, respectively. These features suggest that magnetite and ilmenite crystallized from the Fe-Ti-P-rich silicate magma rather than immiscible nelsonitic melts. It thus can be concluded that the origin of apatite magnetite clinopyroxenites is resulted from crystal fractionation associated with gravitational sorting and setting. In the LZ, magnetite inclusions in olivine contain relatively high Cr_2O_3 (0.07%~0.21%), whereas the Cr_2O_3 (0.00%~0.03%) of magnetite inclusions in olivine from the MZ abruptly decreased. The Cr_2O_3 contents of magnetite inclusions in olivine are positively correlated with An content of plagioclase and Cr content of clinopyroxene. It confirms the replenished parental magmas formed the MZ rocks are different from the relatively primitive parental magmas formed the LZ rocks and ores. The MZ Fe-Ti-P-rich magma may be produced by the Fe-Ti enriched magma from a deep-seated magma chamber mixing with the extensively evolved P-rich magma in a middle level magma chamber. The relatively low Ti+V contents of magnetite of the UZ and the top of MZ suggest the compositions of these magnetites may be modified by magmatic hydrothermal resulted from late stage of magma differentiati

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关键词：磁铁矿 钛铁矿 磷灰石 层状岩体 太和 峨眉山大火成岩省

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