



Nd isotopic composition of the granites with REE tetrad pattern

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Rare earth elements (REEs) have received considerable attention in geochemistry and cosmochemistry because of their similar chemical behaviors and their gradual changes in ionic radii. Compared with Sr, REEs are relatively immobile during various kinds of geological processes. As a result, Nd isotopes in the geologic systems are likely to be changed less than Sr isotopes in the same geologic systems. Recently, a unique and chemically coherent behavior of the rare earth elements (REEs) called as “tetrad effect” from geological sample has spawned considerable interest in geologic systems. The “tetrad” effect consists of four separate curves, encompassing four points, La-Ce-Pr-Nd, Pm-Sm-Eu-Gd, Gd-Tb-Dy-Ho and Er-Tm-Yb-Lu, with Gd being an element common to the second and the third tetrad. One of the characteristic of the granites with REE tetrad effect is that the Nd model ages (T_{DM}) are unreasonable because they are negative or extremely old. The Muamsa and Weolaksan granites are Cretaceous granites with REE tetrad effect, which occurs at the middle part of the Ogcheon belt, South Korea. In order to survey Nd isotopic system in granites with REE tetrad effect, we measured the whole Nd isotopic composition of the Muamsa and Weolaksan granites with REE tetrad effect and without REE tetrad effect. As a result, we could observe that the $^{143}\text{Nd}/^{144}\text{Nd}$ ratios of granites with REE tetrad pattern range from 0.511907 to 0.511969, whereas those without REE tetrad pattern range from 0.511885 to 0.511920. And in plots of $^{87}\text{Rb}/^{86}\text{Sr}$ - $^{87}\text{Sr}/^{86}\text{Sr}$ and $^{147}\text{Sm}/^{144}\text{Nd}$ - $^{143}\text{Nd}/^{144}\text{Nd}$ diagrams, granites with REE tetrad pattern plotted at higher values than those without REE tetrad pattern. However, we could not find anomalies of Nd isotopic composition except $^{143}\text{Nd}/^{144}\text{Nd}$. This suggests that there was no mixing or input of the materials with different Nd isotopic composition during the formation of REE tetrad effect. Our data indicate that REE tetrad effect might be product during differentiation of granitic magma rather than hydrothermal water-rock interaction.