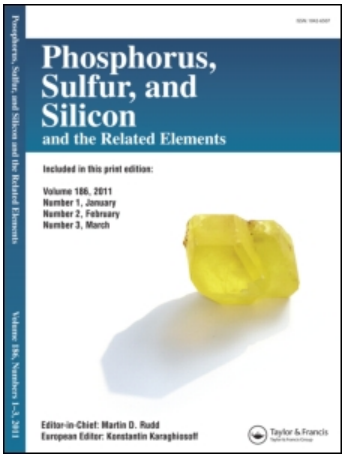

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Determination of Incorporation Forms of Impurities in Apatite by Time-Resolved Luminescence

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DETERMINATION OF INCORPORATION FORMS OF IMPURITIES IN APATITE BY TIME-RESOLVED LUMINESCENCE

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Abstract Apatite of various genesis accommodates trace elements by diverse ways: the structural substitution is preferencial in magmatic type, while the adsorption of independent phases is the main form in sedimentary one.

The chemical analysis of magmatic and sedimentary apatite provides evidence of the existence of many traces which may act as luminescence centers. It is the purpose of our work to utilize the technique of laser-induced time-resolved spectroscopy in order to distinct between the various forms of their accommodation in magmatic and sedimentary apatite. The main results are represented in the following Table.

IMPURITY	APATITE	
	MAGMATIC	SEDIMENTARY
U^{4+}	Structural substitution on the place of Ca (ESR).	
UO_2^{2+}	Not discovered.	Adsorption on the surface as uranyl aquacomplexes and secondary minerals.
U^{6+}	Not discovered.	After heating at 800 ^{o}C U^{6+} diffuses in fluorite which forms as result of heating.
REE^{2+}	Eu and Sm: structural substitution instead of Ca.	Adsorption on the surface.
REE^{3+}	Ce, Tb, Tm, Ho, Dy, Pr, Sm, Eu, Nd: structural substitution instead of Ca.	At 800 ^{o}C REE diffuse in apatite (fluorite) lattice.
Mn^{2+}	Structural substitution on the place of Ca.	Adsorption on the surface and structural substitution instead of Ca (ESR).
Mn^{5+}	Structural substitution on the place of P.	After heating at 800 ^{o}C Mn^{5+} diffuses on the place of P.
Cr^{5+}	Structural substitution on the place of P (ESR data).	Not discovered.
Cr^{3+}	Structural substitution or in the	independent mineral phase.
H_2O	Not discovered	Structural and adsorbed.
O_2^2	Not discovered	Structural.