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Synthesis method of multimodal radiotracers for industrial processes and environmental research

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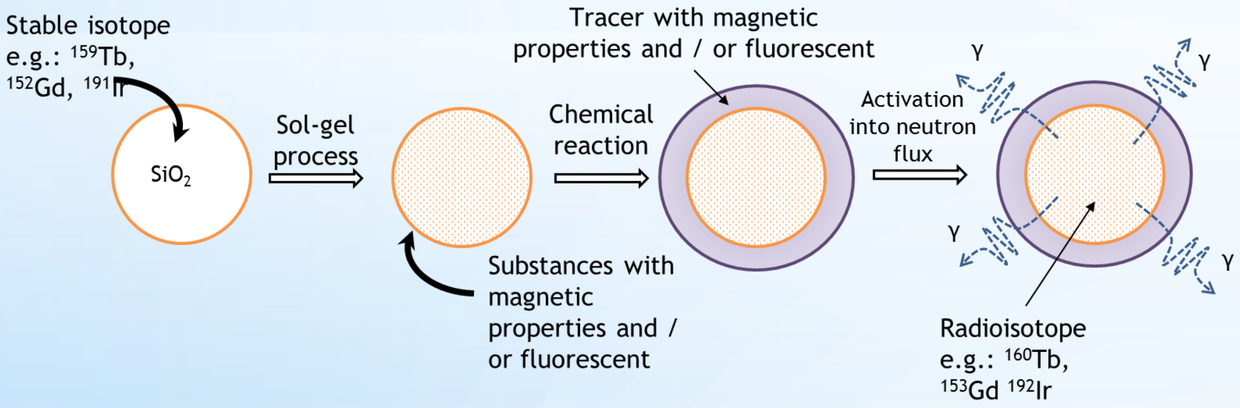
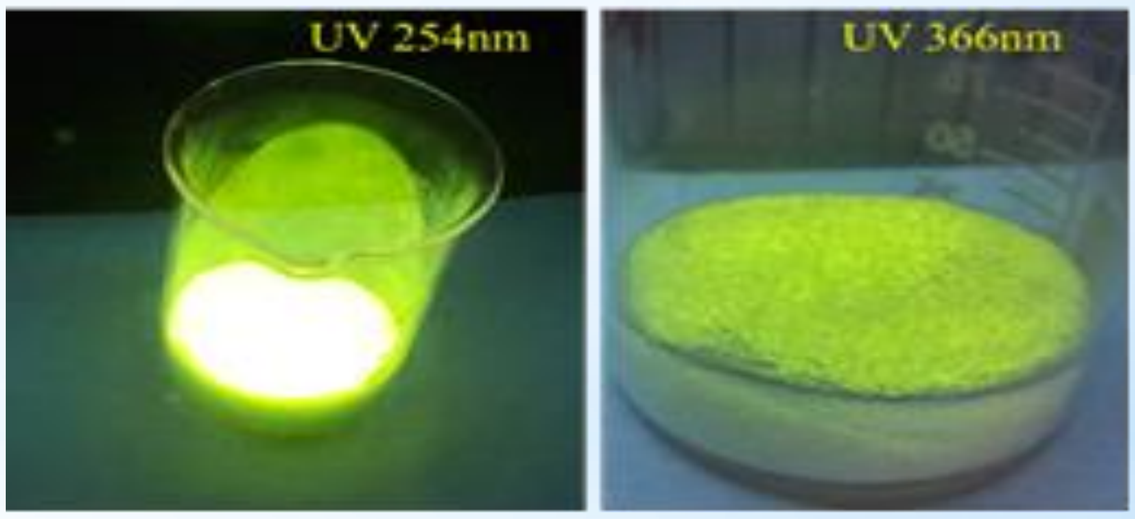
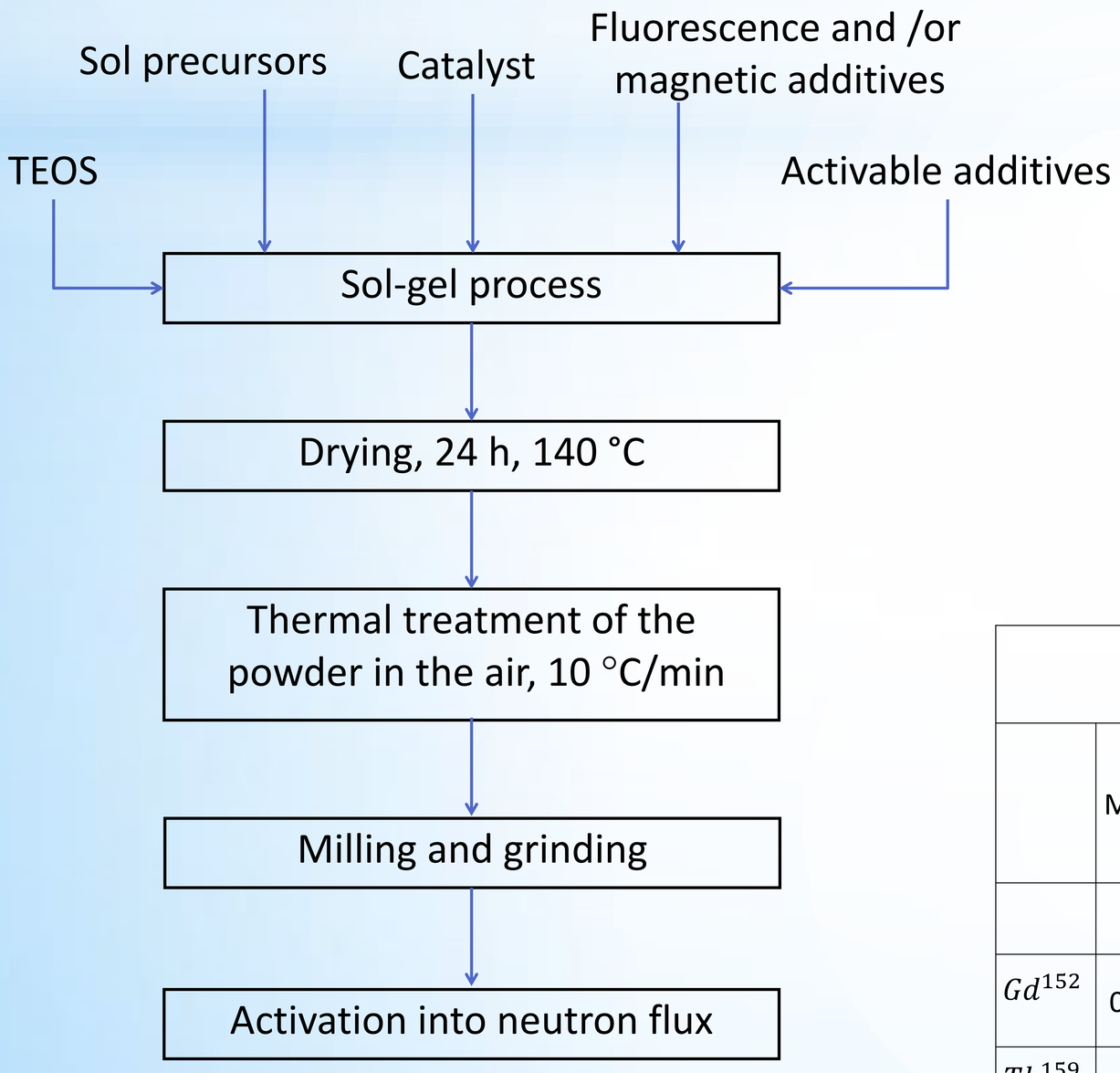
The advanced nanotracers with combined properties are very unique and can be used for wide range of applications The objective of the project was elaboration of applicable method for labeling of the surface of micro particles of sand or clay by radiotracers which also have got fluorescence properties. Proposed materials can be used for investigations to follow silica or clay particles along their routes of transfer. Advanced chemical and ceramic technologies as sol-gel process were used.



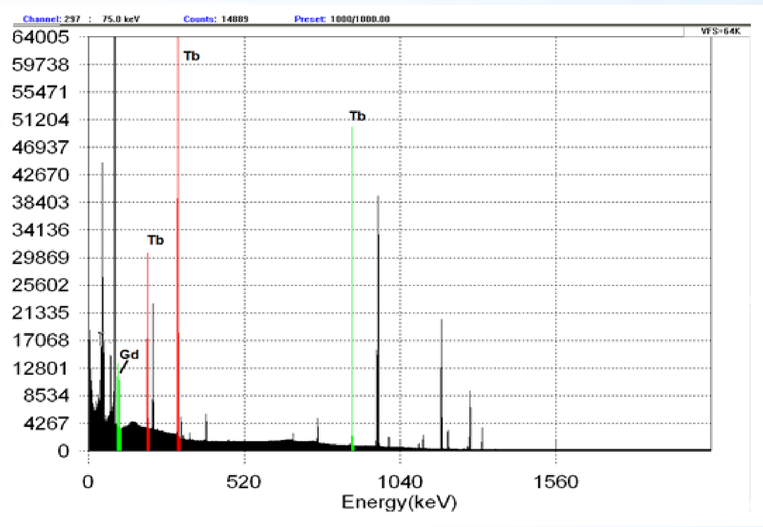


The idea of multifunctional radiotracer



The method of synthesis of multimodal radiotracers by sol-gel process

A fluorescence phenomena into UV light



Gamma spectrum of radiotracer

$Tb^{159} \xrightarrow{n,\gamma} Tb^{160}$

$T_{1/2}$= 73 days

Tb^{159} σ>22 barns

$Gd^{152} \xrightarrow{n,\gamma} Gd^{153}$

$T_{1/2}$= 200 days

Gd^{152} σ<125 barns

Mass of the sample: 0,002484g
$95SiO_2$-$4Gd_2O_3$-$1Tb_2O_3$

	Me mass	Abundance	n flux	cross section	Activation time	Half-life ($t_{1/2}$)	Cooling time	radioactivity
	[g]	[%]	[n/cm^{2}s]	[barns]	[h]	[h]	[h]	[Bq]
Gd^{152}	0.00017	0.2	1E+14	125	0,67	200	96	1580
Tb^{159}	4.7E-05	100	1E+14	22	0,67	73	96	98705

Activation condition of the tracers into neutron flux

Acknowledgments
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