Development of diamond indicators for TSS and radar separation

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Problem *:*

The use of operational control of the degree of extraction and safety of a valuable component in technological processes, improving the quality of the operation of devices that extract diamonds from ore are of paramount importance for the diamond mining industry. Radioactive indicators have found great application in the express control of technological enrichment processes. Currently, searches are underway to replace indicators based on natural raw materials with simulators and tracers with similar physical and chemical parameters.

Target:

Create indicators of diamond on the properties of luminescence and density.

Tasks *:*

1. Analysis and data collection on the properties of diamond .
2. Testing the properties of indicators .
3. Creating indicator samples .

INSTRUMENTS AND RESEARCH METHODS :

X-ray luminescent analysis , separator Polus-M

Microscopic analysis

UV study

weight

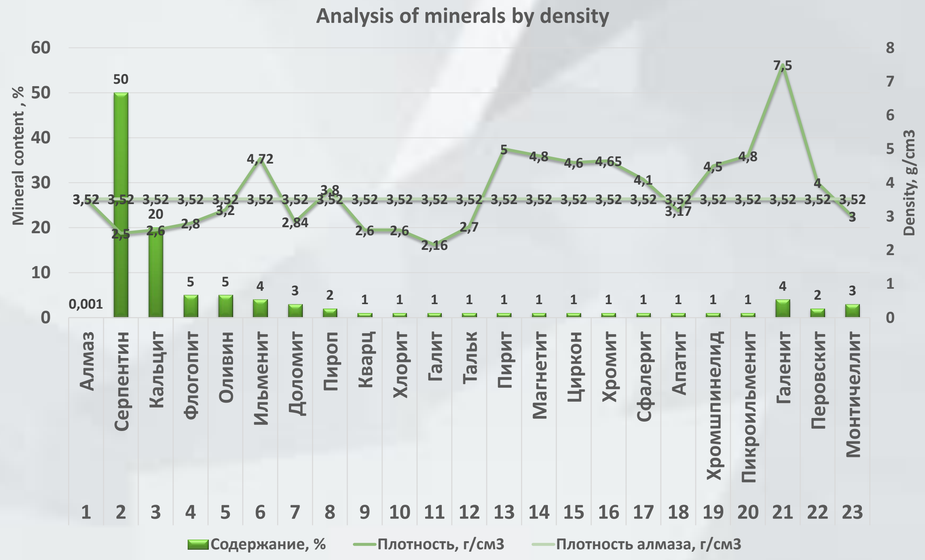
Assessment of diamond properties

Density of diamond

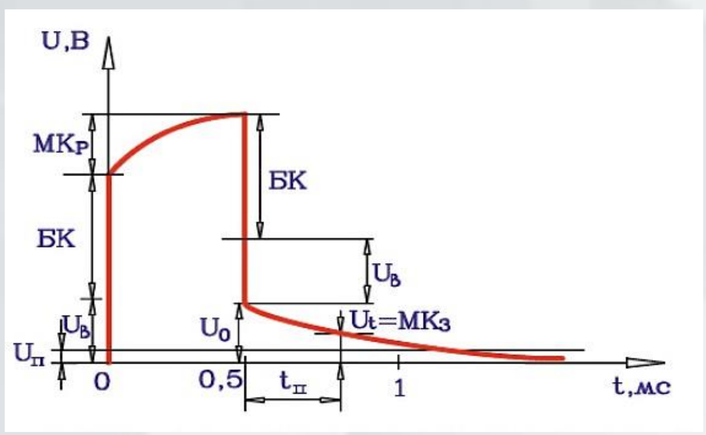
3.47 - 3.55 g/cm³

Separation density of minerals in HSS

2.4 g/cm³



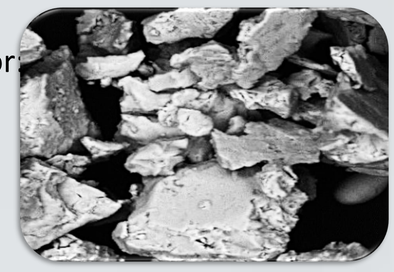
Luminescence spectrum of diamond

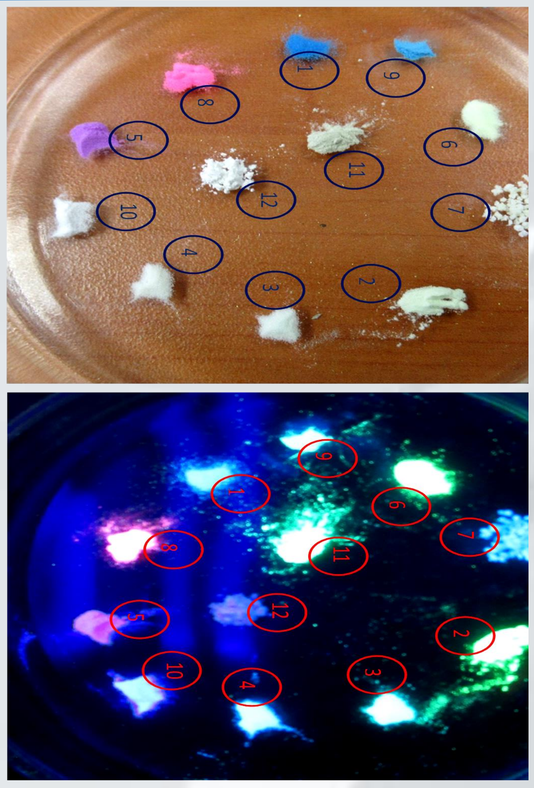


Stages of work

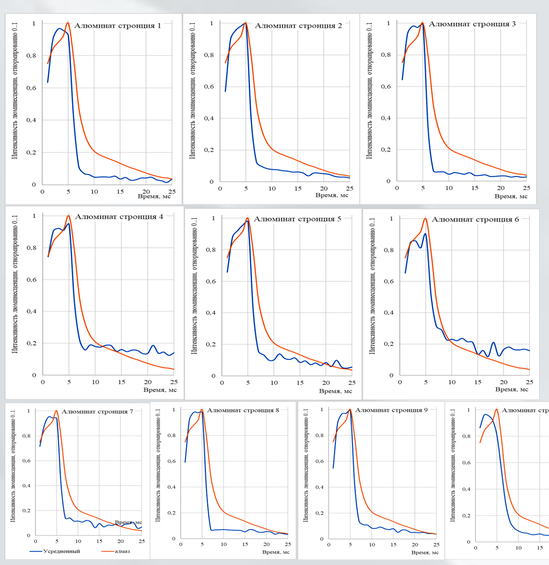
- protective shell (plastic packaging , epoxy resin , 3D printer resin) .

- assigning properties to the indicator: luminescence (phosphor) , density (powdered ferrosilicon) .





No.	brand
one	FL-530
2	Anthracene (organic)
3	Strontium aluminate, blue
4	Strontium aluminate, yellow-green
five	Strontium aluminate, turquoise
6	Strontium aluminate, sky blue
7	Strontium aluminate, purple
eight	Strontium aluminate, yellow
nine	Strontium aluminate, sky blue (large)
10	Strontium aluminate, pink
eleven	Strontium aluminate, blue
12	Strontium aluminate, white
13	EL 570M
fourteen	FK-110
fifteen	Terphenyl
16	Luminol
17	Tolan
eighteen	R-530
nineteen	FS-4
twenty	RS-424
21	FK-1
22	FK-2
23	E-455-115(220)
24	E-515-115(220)



Phosphor	Degree of deviation, dv	Phosphor	Degree of deviation, Dv
Strontium aluminate, №1	6	**E-515 -115**	**4**
Strontium aluminate, №2	4	EL-570, 1 mg	five
Strontium aluminate, №3	3	FK-110, 1 mg	3
Strontium aluminate, №4	4	**FL-530**	**3**
Strontium aluminate, No. 5	3	Anthracene	7
Strontium aluminate, №6	4	Luminol	6
Strontium aluminate, No. 7	3	Tolan	eight
Strontium aluminate, No. 8	five	Terphenyl	7
Strontium aluminate, No. 9	3		
Strontium aluminate, №10	4		

The degree of deviation of the X-ray luminescence signal shape of phosphors to the signal shape of natural diamond (14 - maximum, 0 - minimum)

In ultraviolet light

In daylight

No.	Name	Cost , rub .
one	Epoxy resin , 1 l	1500
2	Phosphors , 100 g	230
3	Ferrosilicon , 100 g	750
4	Form for pouring	300
	Total:	2780

The cost of 1 indicator is 278 rubles .

AK ALROSA (PJSC):

- Mirninsko-Nyurbinsky GOK, Aikhalsky GOK, Udachninsky GOK
- Institute " Yakutniproalmaz ", OJSC " Severoalmaz ", JSC "Almazy - Anabara "