ostec
corporate group

future's
in the making

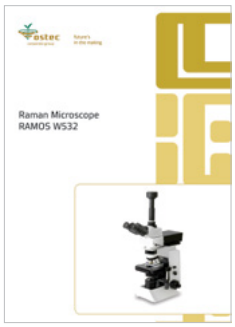
Optical emission spectrometer for metal and alloy analysis SEOS 02

Ostec Instruments produces and offers hi-tech innovative scientific and analytical equipment.

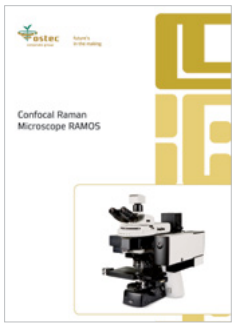
Our mission is to be a company that finds, selects, protects and develops cutting-edge ideas to create new products and technologies and deliver technological progress. That is why the symbol of our company is a growing sprout.

We provide complete solutions for our clients: the best equipment to meet customer's requirements, deep knowledge of customer's applications, qualified and reliable maintenance support.

OUR other products:



Raman Microscope RAMOS W532

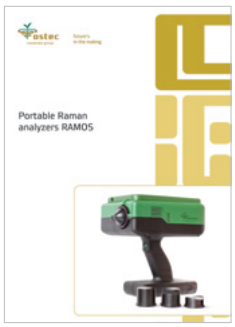


Confocal Raman Microscope RAMOS

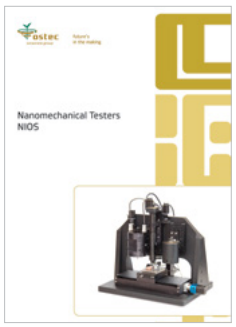
Optical components OCOS

Laser elemental analyzer LIOS 500N

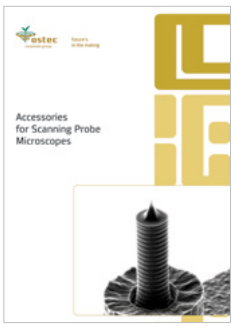
Vibration Control Solutions AVOS



Portable Raman analyzers RAMOS

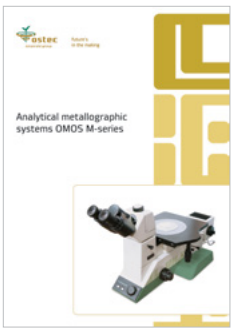


Nanomechanical Testers NIOS



Accessories for Scanning Probe Microscopes

FTIR spectrometers and microscopes IROS



Analytical metallographic systems OMOS M series

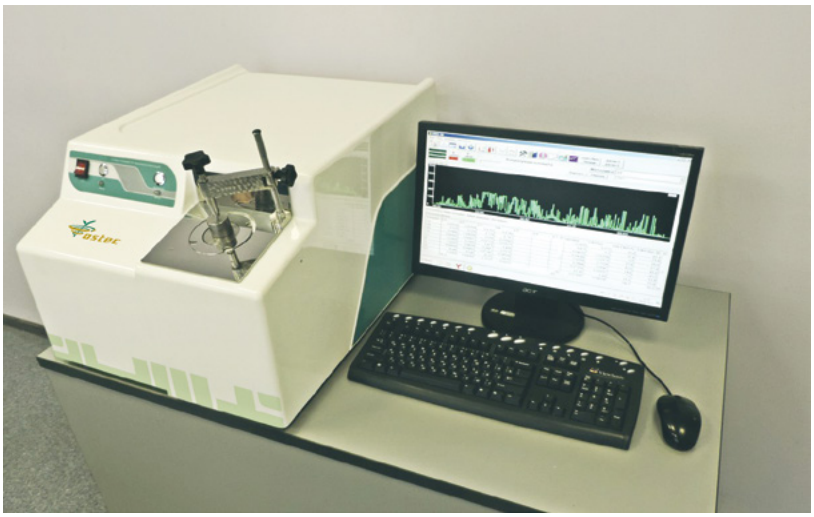
Created by highly qualified scientists, engineers and designers, more than 100 reliable and robust SEOS 02 spectrometers work successfully all over the world.
Our specialists constantly improve main units of SEOS 02 supported by not only their experience in Russian high-tech industry and Russian Academy of Science, but also by best world achievements in science and technology. Our team works for better:

- Safety
- Ergonomics
- Analytical parameters

Production and development are certified in accordance with to ISO 9001.

SEOS 02 — optical emission spectrometer

SEOS 02 is the best solution for the customers, who need quick analysis, high specifications, safety and fair accuracy of element composition identification results in metal production at minimal purchase, commission and operating of the device costs.



Applications:

- Industrial analytical laboratories of metallurgical and machine-building factories;
- Express-analysis of alloys while melting at workshops;
- Identification of alloy grade at warehouses;
- Research institutes and universities.

SEOS 02 advantages

Alloys and elements to analyze

- SEOS 02 identifies the composition of iron alloys (all types of steel and cast iron) and non-ferrous alloys on any basis (Al, Cu, Zn, Ni, Ti, Mg, Co, Pb, etc.).
- CCD allows to analyze the whole range of basic elements used in metallurgy, including S, P, C.

Metrological performance

- SEOS 02 measurement accuracy is in accordance with international regulatory documents.
- Every SEOS 02 spectrometer passes state verification procedure as a measuring instrument.
- These tests prove advanced metrological parameters of 5E05 02 spectrometers.
- Measured elements concentration range: 0.0005% – 45%.
- Relative error: 0.3% – 5% (depending on the concentration).

Economics

- SEOS 02 spectrometer has the best price/performance ratio.

Special features

Optical block

Vacuum construction:
- Allows to get the best metrological characteristics among the spectrometers made with CCD;
- Does not depend on the noble gas quality in comparison with the non-vacuum analogues.

New polychromator construction:
- Is more solid and easy to maintain;
- Allows to adjust key spectral lines as precisely as possible;
- Permits resetting in case of considerable changes in analytical tasks.

Frame

New composite material frame design ensures:
- Outstanding interference immunity;
- Temperature oscillations resistance;
- Ambient influence protection;
- Easy maintenance.

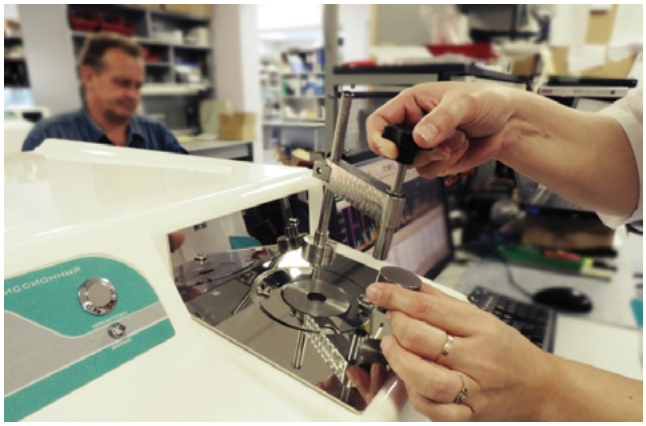
Spark generator

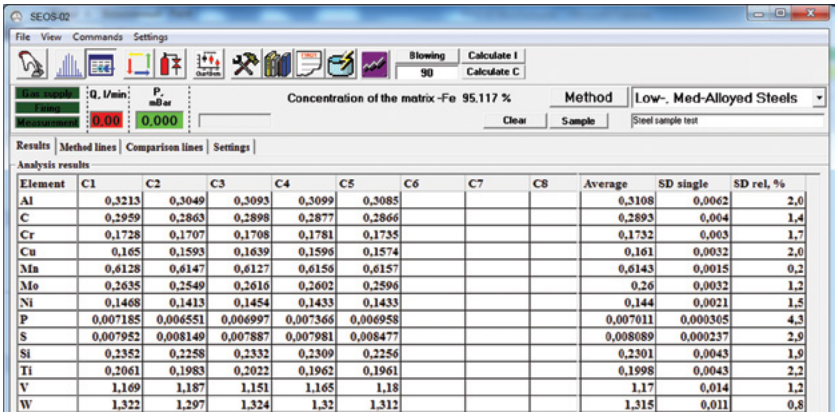
New spectrum excitation source allows to choose optimal for the existing analytical task configuration. Various modes and their combinations – high-energy sparking, spark modes with various options, including quasi-arc – allow to deal with wide range of analytical tasks, including ultra pure copper and high silicon content alloys analysis.

Spark rack

New construction ensures:

- Easy and quick sample setting;
- Simple tungsten counter electrode maintenance;
- Quick (≤ 30 s) safety glass replacement;
- Bidirectional argon air cooling and adapters allow thin and small sample analysis.

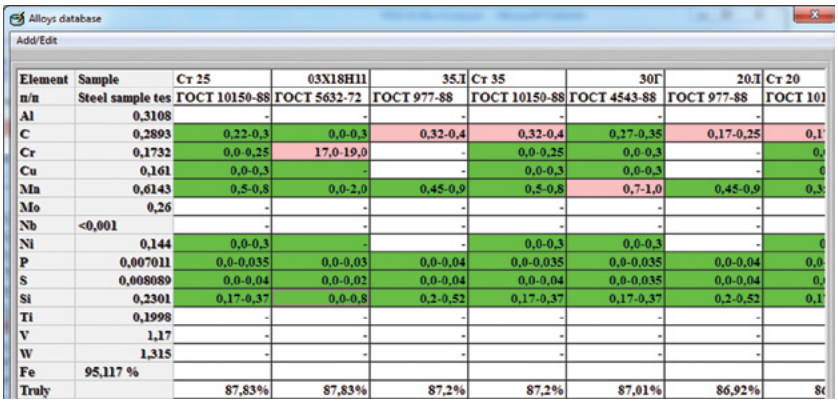




Element	C1	C2	C3	C4	C5	C6	C7	C8	Average	SD single	SD rel, %
Al	0,3213	0,3049	0,3093	0,3099	0,3085				0,3108	0,0062	2,0
C	0,2959	0,2863	0,2898	0,2877	0,2866				0,2893	0,004	1,4
Cr	0,1728	0,1707	0,1708	0,1781	0,1735				0,1732	0,003	1,7
Cu	0,165	0,1593	0,1639	0,1596	0,1574				0,161	0,0032	2,0
Mn	0,6128	0,6147	0,6127	0,6156	0,6157				0,6143	0,0015	0,2
Mo	0,2635	0,2549	0,2616	0,2602	0,2596				0,26	0,0032	1,2
Ni	0,1468	0,1413	0,1454	0,1433	0,1433				0,144	0,0021	1,5
P	0,007185	0,006551	0,006997	0,007366	0,006958				0,007011	0,000305	4,3
S	0,007952	0,008149	0,007887	0,007981	0,008477				0,008089	0,000237	2,9
Si	0,2352	0,2258	0,2332	0,2309	0,2256				0,2301	0,0043	1,9
Ti	0,2061	0,1983	0,2022	0,1962	0,1961				0,1998	0,0043	2,2
V	1,169	1,187	1,151	1,165	1,18				1,17	0,014	1,2
W	1,322	1,297	1,324	1,32	1,312				1,315	0,011	0,8

SEOS 02 analysis results:

- 5 parallel measurements (C1, C2, C3, C4, C5)
- Average chemical element concentration value (Average)
- Relative standard deviation (SD rel, %)



Element	Sample	Ст 25	03Х18Н11	35.Т	Ст 35	30Г	20.Т	Ст 20
n/n	Steel sample tes	ГОСТ 10150-88	ГОСТ 5632-72	ГОСТ 977-88	ГОСТ 10150-88	ГОСТ 4543-88	ГОСТ 977-88	ГОСТ 101
Al	0,3108	-	-	-	-	-	-	
C	0,2893	0,22-0,3	0,0-0,3	0,32-0,4	0,32-0,4	0,27-0,35	0,17-0,25	0,1
Cr	0,1732	0,0-0,25	17,0-19,0	-	0,0-0,25	0,0-0,3	-	0,
Cu	0,161	0,0-0,3	-	-	0,0-0,3	0,0-0,3	-	0
Mn	0,6143	0,5-0,8	0,0-2,0	0,45-0,9	0,5-0,8	0,7-1,0	0,45-0,9	0,3
Mo	0,26	-	-	-	-	-	-	
Nb	<0,001	-	-	-	-	-	-	
Ni	0,144	0,0-0,3	-	-	0,0-0,3	0,0-0,3	-	0
P	0,007011	0,0-0,035	0,0-0,03	0,0-0,04	0,0-0,035	0,0-0,035	0,0-0,04	0,0
S	0,008089	0,0-0,04	0,0-0,02	0,0-0,04	0,0-0,04	0,0-0,035	0,0-0,04	0,
Si	0,2301	0,17-0,37	0,0-0,8	0,2-0,52	0,17-0,37	0,17-0,37	0,2-0,52	0,1
Ti	0,1998	-	-	-	-	-	-	
V	1,17	-	-	-	-	-	-	
W	1,315	-	-	-	-	-	-	
Fe	95,117 %							
Truly		87,83%	87,83%	87,2%	87,2%	87,01%	86,92%	8

Alloy grade identification using SEOS 02 alloys database of alloys in the SEOS 02 software

Spark spots on burning samples

Software

SEOS 02 software is adapted to Microsoft Windows and has a wide range of functions:

- Control of the gas-vacuum system;
- Automatic profiling and accounting drift;
- Graphic spectrum representation with the opportunity of spectral lines identification;
- Analysis results export to MS Office;
- Concentration estimation (% and ppm);
- Alloys database with the opportunity to add one's own grades;
- One-point and two-point recalibration;
- Analysis process indicator and electronics self-diagnostic;
- Qualitative analysis if there are no corresponding methods installed on the spectrometer;
- Free access to the factory calibrations and curves;
- Opportunity to create one's own analytical methods;
- Individual spectral background account for each line;
- Several spectral lines and comparison lines for each element;
- Automatic best comparison lines selection;
- Unique processing results algorithm, based on correlation analysis for the random and systematic errors reduction;
- Automatic inter-element additive and multiplicative effects account.

Analytical capabilities for the most popular groups of alloys*

Element	Fe-base		Cu-base		Al-base	
	Min, %	Max, %	Min, %	Max, %	Min, %	Max, %
C	0,001	4,0	0,002	0,04	-	
Si	0,001	4,0	0,0001	7,5	0,0003	25,0
Mn	0,001	28,0	0,0005	7,0	0,0001	12,0
P	0,0005	1,2	0,0005	1,1	0,001	0,02
S	0,0005	0,7	0,0004	0,13	-	
Cr	0,001	30,0	0,00002	2,5	0,0001	0,37
Ni	0,001	35,0	0,00005	35,0	0,001	4,5
Mo	0,0005	11,0	-		0,005	0,02
V	0,0005	11,0	-		0,0005	0,12
W	0,005	19,0	-		-	
Fe	base		0,0004	6,5	0,001	3,3
Cu	0,0005	8,0	base		0,001	22,0
Al	0,001	3,0	0,0005	12,5	base	
Ti	0,0005	3,0	0,0001	0,9	0,0005	0,3
Mg	0,005	0,12	0,0001	0,2	0,0001	11,0
Zn	0,001	0,03	0,0001	46,0	0,0001	12,0
Pb	0,003	0,25	0,0005	22,0	0,0005	1,0
Sn	0,0004	0,19	0,0003	22,0	0,001	1,0
Sb	0,005	0,15	0,0005	1,3	0,005	0,14
Nb	0,001	3,0	0,005	1,3	-	
As	0,001	0,1	0,0001	0,5	0,001	0,01
Ag	-		0,0001	1,6	0,0003	1,1
B	0,0004	1,1	0,0002	0,01	0,0002	0,03
Bi	0,007	0,12	0,0001	4,5	0,001	0,65
Be	-		0,0001	3,5	0,0001	2,8
Co	0,0005	10,0	0,0001	2,4	0,001	0,65
Ca	0,0001	0,01	-		0,0001	0,02
Cd	-		0,0003	0,13	0,001	0,35
Ce	0,0025	0,25	-		0,0025	0,05
Se	0,001	0,4	0,0001	1,4	-	
Zr	0,001	0,1	0,0002	0,4	0,0001	0,33
Li	-		-		0,0002	0,05
Ga	-		-		0,0005	0,04
Te	-		0,0003	0,07	-	

* SEOS 02 spectrometer can analyze any other Ni, Co, Mg, Zn, Ti, Pb, Sn etc. based alloys.

Specification

Dimensions and weight

Length, mm	690
Width, mm	510
Height, mm	400
Weight, kg	50

Optical system

- Paschen-Runge scheme
- Rowland circle diameter is 330 mm
- Reciprocal dispersion is 1.4 nm/mm
- Spectral resolution is ≤ 0.04 nm
- Diffraction grating is 2100 line marks/mm
- Multi-element CCD system with a total of more than 25000 channels and the size of the channel of about 8 μm
- Spectral range is 174-455 nm (non-vacuum option: 185-455 nm)
- Automatic profiling and accounting drift
- Minimum spectrum accumulation time is ≥ 0,001 s

Vacuum system

- Vacuum pump
- Oil mist trap
- Vacuum computer control

Spectrum excitation system

- Low voltage unipolar spark in argon atmosphere (or quasi-arc in argon atmosphere)
- Voltage in modes: 300, 400, 500 V
- Capacitance in modes: 2, 4, 6 uF
- Discharge frequency, voltage and pulse energy computer control
- Automatic discharge parameters change in the transition from sparking to the analysis
- Open table design
- Tungsten electrode

Control and data processing system

- Integrated computer
- Windows 7 or better
- Monitor and printer connections
- Opportunity of corporate network and the Internet connection
- Measurement results transfer via USB-drive

Operating conditions

Spectrometer to be operated indoors, meeting following requirements:

Ambient temperature	10-35 ºC
Atmospheric pressure	84-106,7 kPa (630-800 mm Hg)
Relative humidity (at T=25 ºC)	≤ 80%
Electrical power	220 +22-33) V, (50±2) Hz

For notes

For notes

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