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Controlled synthesis of ultra dispersed (nanosized) rhenium oxides (IV) and (VI): synthesis of precursors and properties of materials

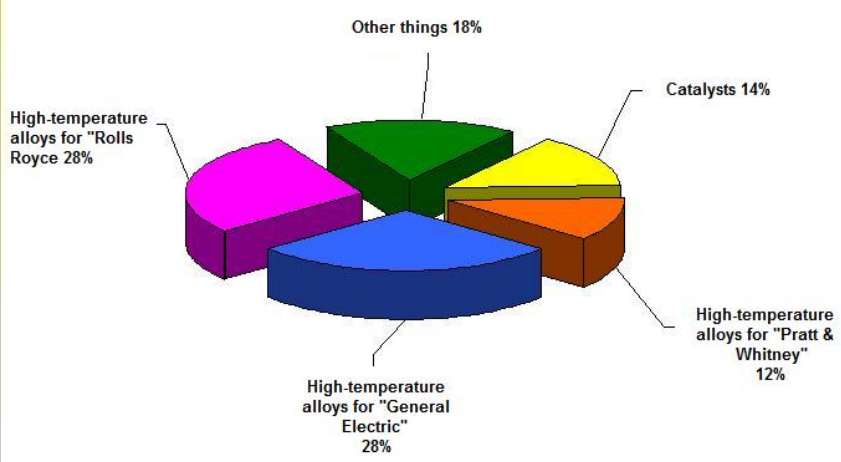


K. A. Smirnova

Moscow, 2011





Consumption of rhenium in the 2006



| Category | Percentage |
|--|------------|
| High-temperature alloys for "Rolls Royce" | 28% |
| High-temperature alloys for "General Electric" | 28% |
| Other things | 18% |
| Catalysts | 14% |
| High-temperature alloys for "Pratt & Whitney" | 12% |

*Proceedings of the institutes of higher education, nonferrous metallurgy, №6, 2007, 40 p.

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The goal and the scientific problems of the work

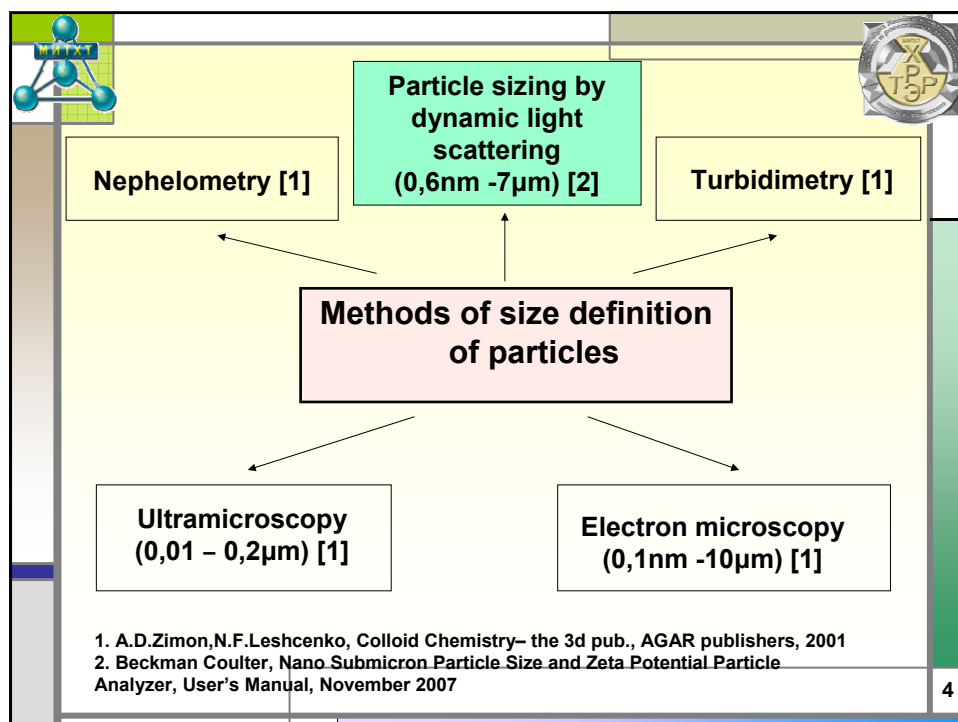
The goal: the development of the methods of the obtaining the rhenium based functional ultra dispersed (nanosized) materials with application as precursors homo - and heteroligand rhenium alkoxocomplexes and the study of their physicochemical properties.

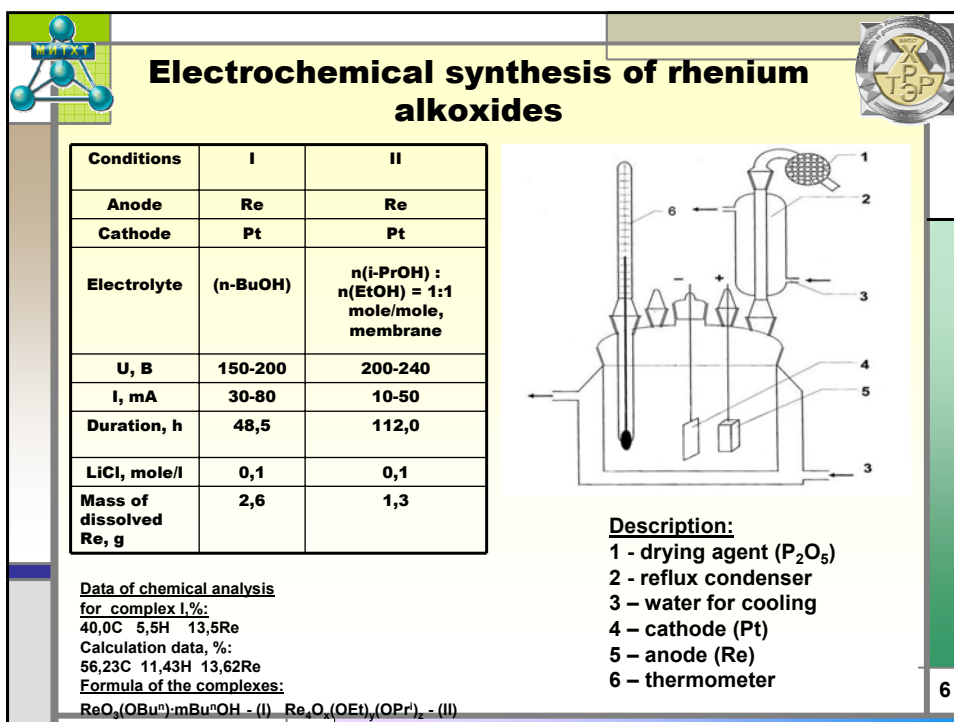
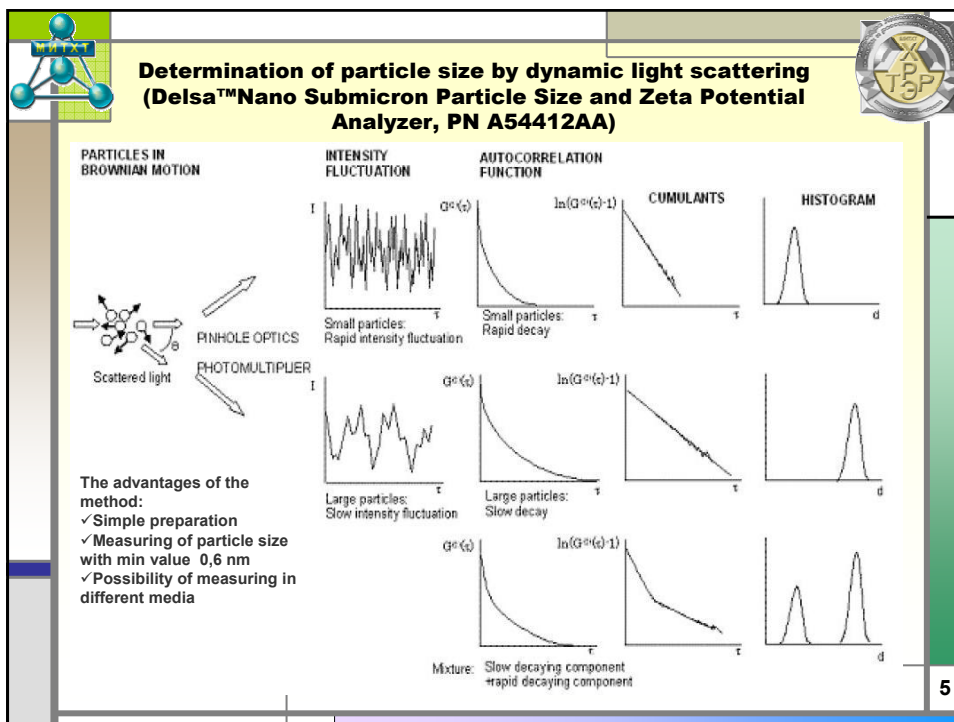
The scientific problems:

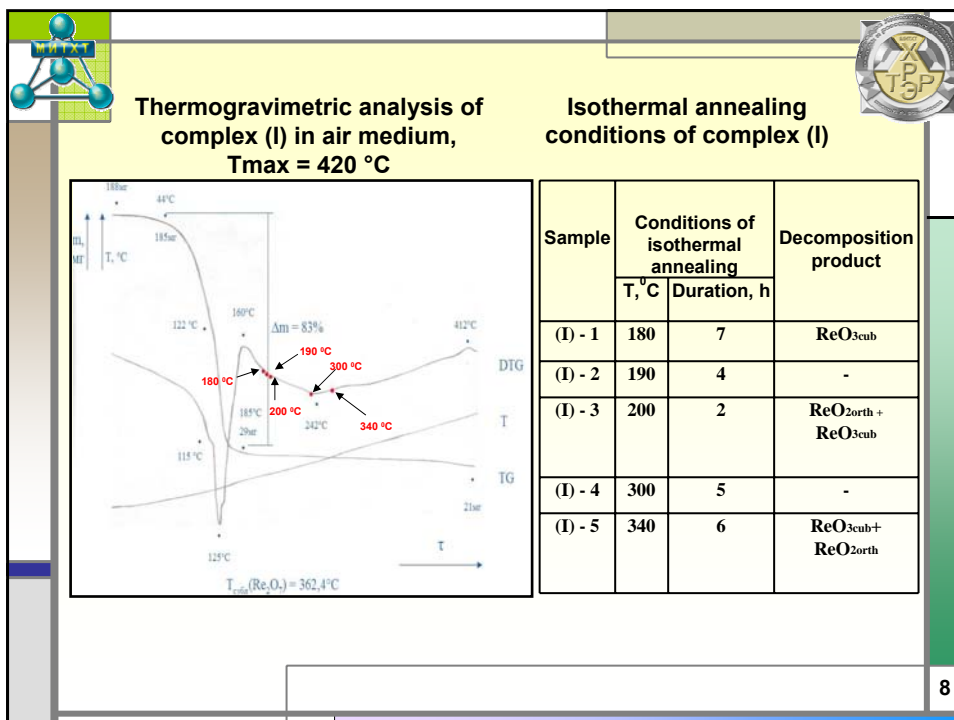
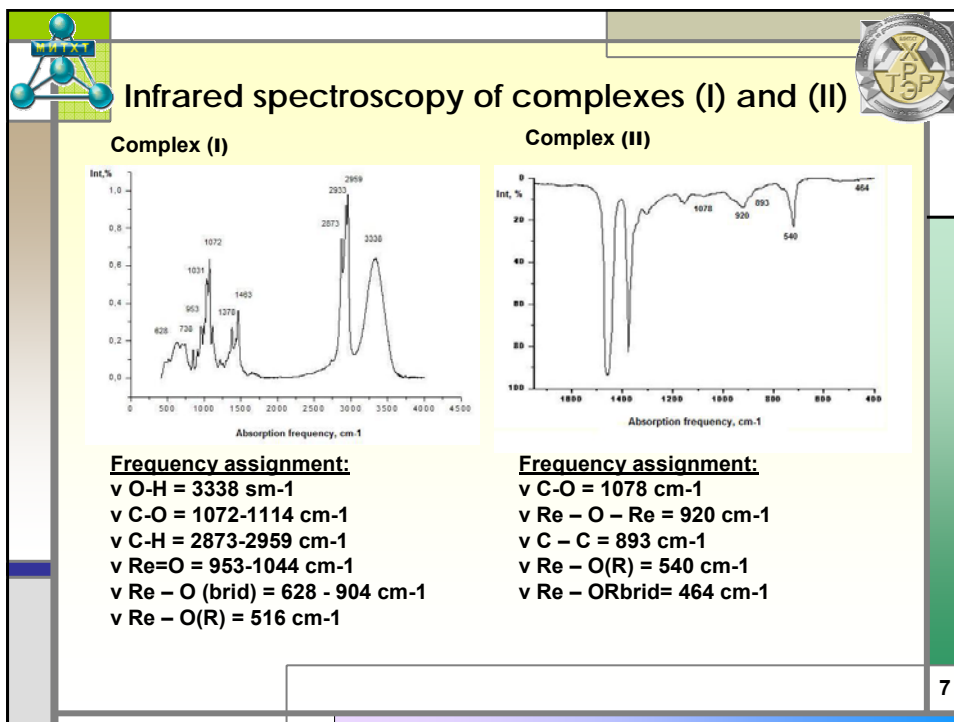
- Improvement of electrochemical synthesis to obtain $(\text{ReO}_3(\text{OBu}^n)\cdot m\text{Bu}^n\text{OH})$ (I) and $(\text{Re}_4\text{O}_x(\text{OEt})_y(\text{OPr}^i)_z)$ (II)
- Research of the thermal decomposition processes of the obtained complexes
- The development of methods of obtaining ultra dispersed (nanosized) Re oxide (IV) and Re oxide (VI)

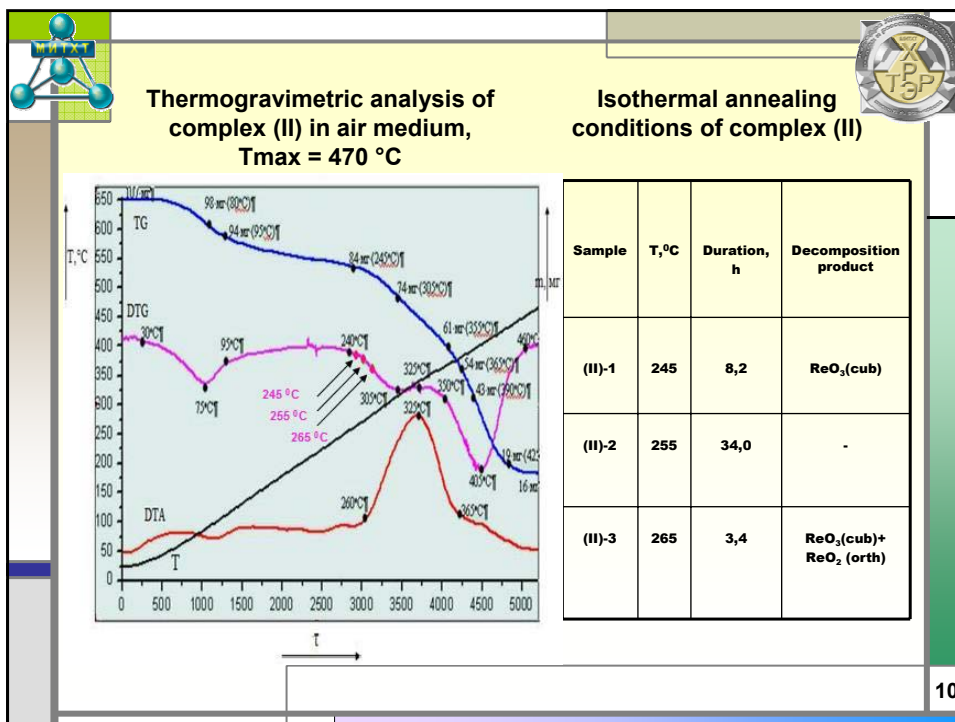
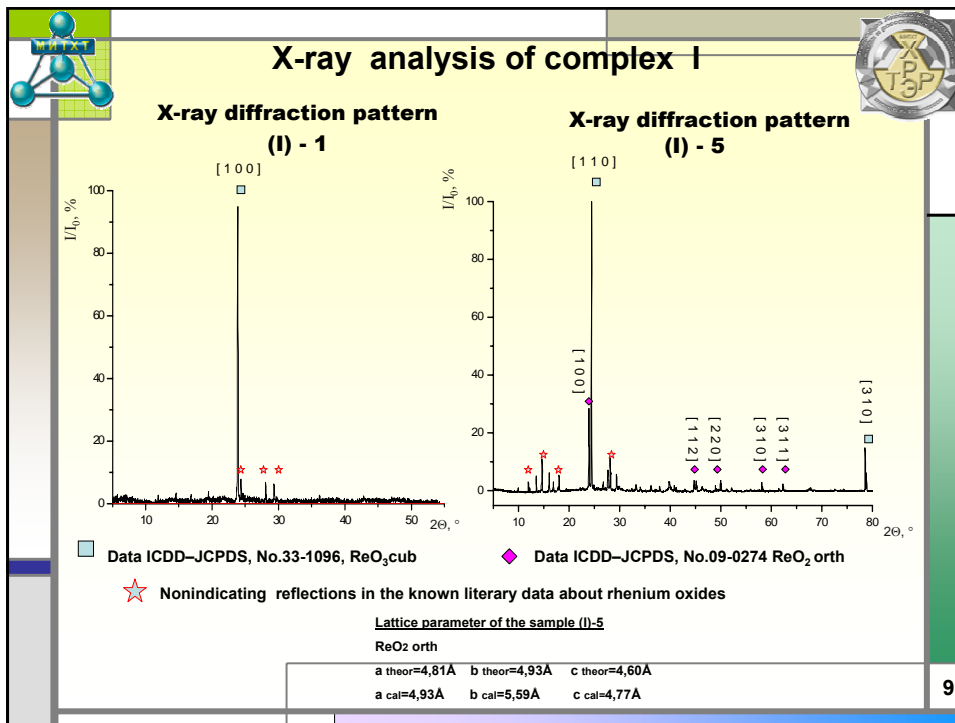
Nanosized materials are universally defined as materials, the basic structural elements of which don't exceed nanotechnological border in 100 nanometers.

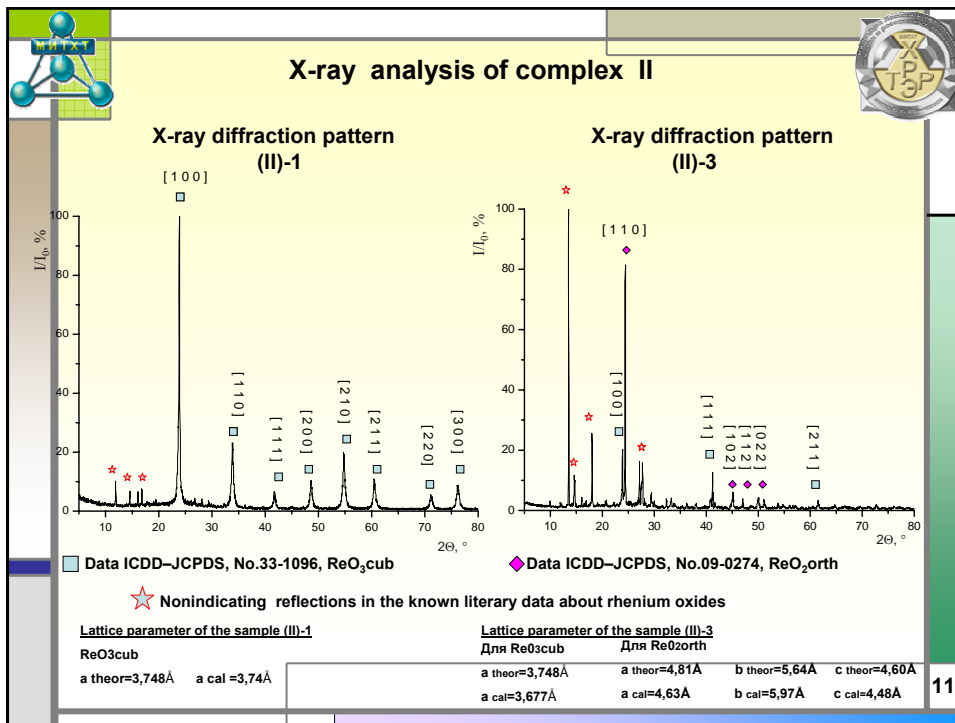
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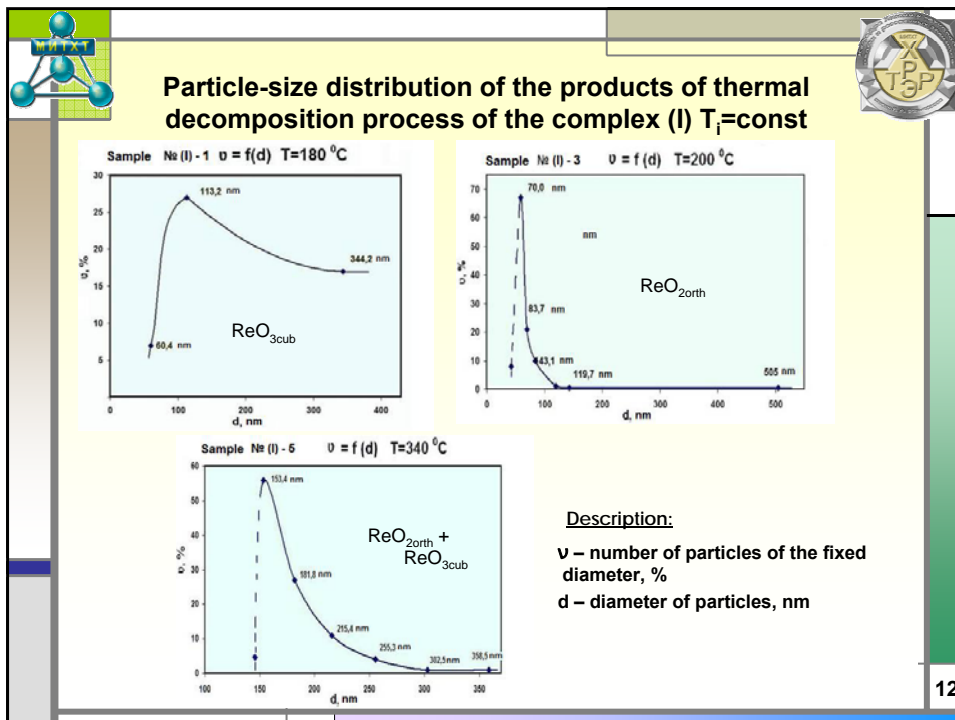








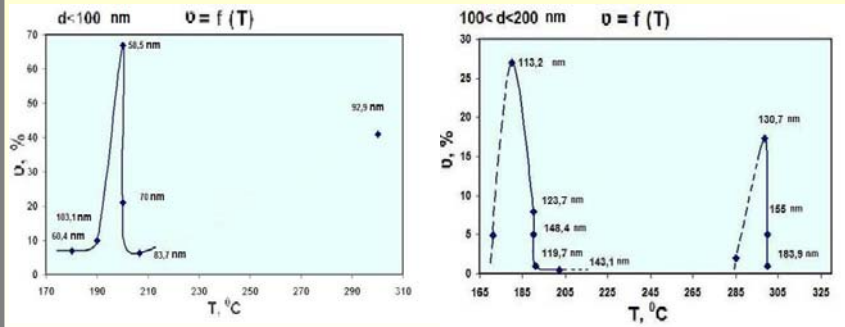
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Controlled synthesis of rhenium oxides (IV) and (VI) with set granulometric composition of the complex (I)

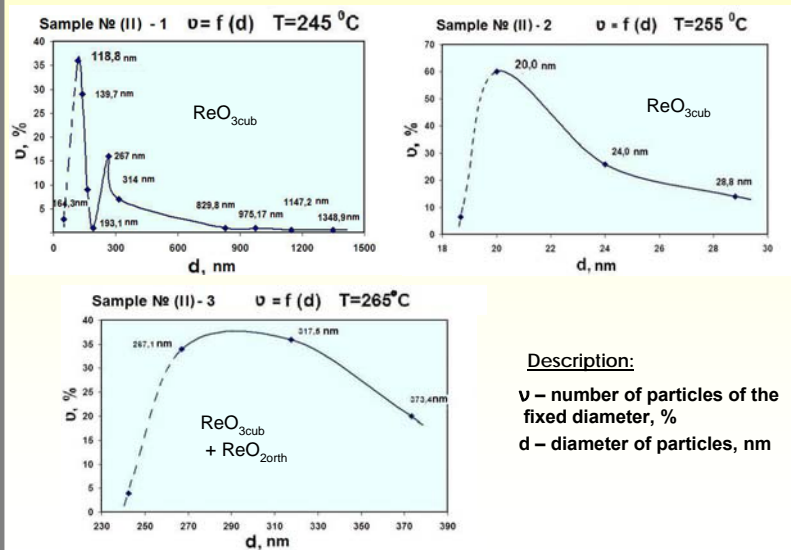


Description:

v – number of particles of the fixed diameter, % T - temperature, °C



Particle-size distribution of the products of thermal decomposition process of the complex (II) $T_i = \text{const}$



Description:

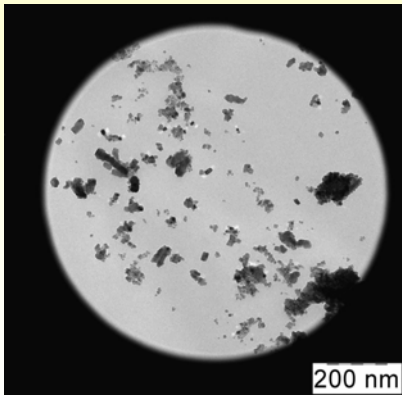
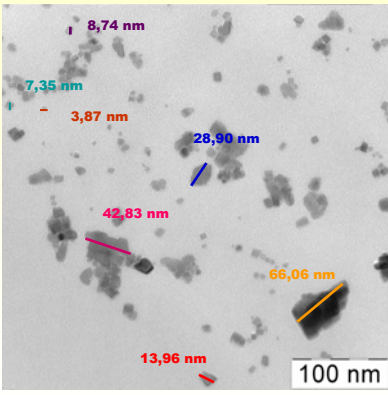
v – number of particles of the fixed diameter, %
d – diameter of particles, nm

Controlled synthesis of rhenium oxides (IV) and (VI) with set granulometric composition of the complex (II)

| Range of diameter measuring, nm | T, °C | v, % | d, nm | Range of diameter measuring, nm | T, °C | v, % | d, nm |
|---------------------------------|-------|------|---------|---------------------------------|-------|------|---------|
| d<100 | 255 | 60,0 | 20,0 | 100 < d < 200 | 245 | 36,0 | 118,8 |
| | | 26,0 | 24,0 | | | 29,0 | 139,7 |
| | | 14,0 | 28,8 | | | 9,0 | 164,3 |
| | 255 | 1,0 | 193,1 | | 255 | 1,0 | 193,1 |
| Range of diameter measuring, nm | T, °C | v, % | d, nm | Range of diameter measuring, nm | T, °C | v, % | d, nm |
| 200 < d < 500 | 245 | 16,0 | 267,0 | d>500 | 245 | 1,0 | 829,8 |
| | | 7,0 | 314,0 | | | 1,0 | 975,2 |
| | | 34,0 | 257,1 | | | 1,0 | 1147,2 |
| | 265 | 34,0 | 347,5 | | | 0,5 | 1348,9 |
| | 265 | 12,0 | 30608,5 | | 265 | 12,0 | 30608,5 |

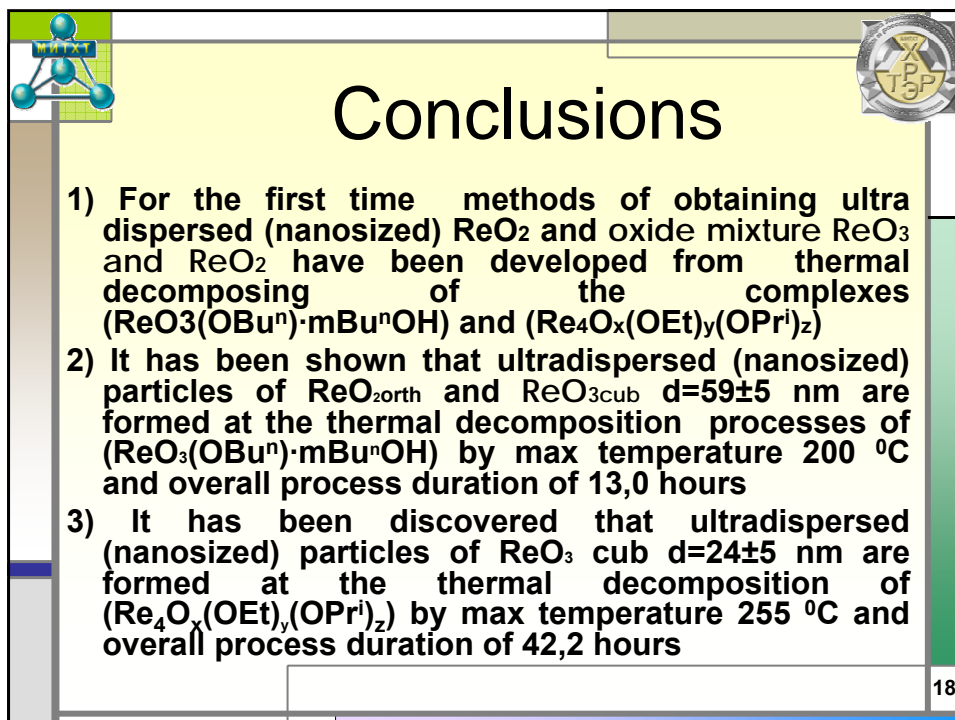
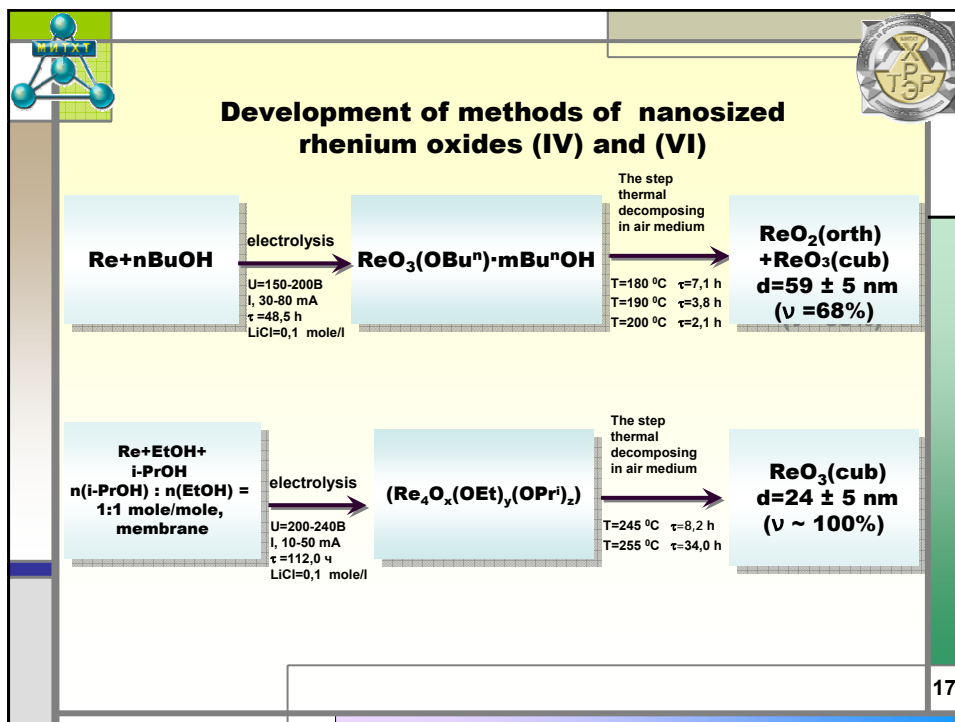
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Electron microscopy (LEO912 AB OMEGA) Sample 1 (II)

The basic microscope characteristics
 Image resolution: 0,02-0,34 nm
 Region of light: 1-75 мкм
 Magnification: from 80x to 500 000x

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***Thanks for your
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