**Synthesis of novel nanocarbons (lead Omsk)**

**Table 1**. Regulation of pore distribution by changing solvent in dehydrochlorination process

(chlorinated polyvinyl chloride was treated with КОН at 20 °С for 5 h.; thermal treatment conditions: carbonization – 400 °С, 30 min; activation - СО2, 900 °С, 5 min).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Solvent | S BET,  m2/g | HK  calculations | | Adsorption branch | | Desorption  branch | |
| Vmicro, сm3/g | H,  Å | Vmeso, сm3/g | Dmeso,  Å | Vmeso, сm3/g | Dmeso,  Å |
| dimethyl-sulfoxide | 1009 | 0.40 | 5.8 | 0.79 | 184 | 0.84 | 150 |
| tetra-hydrofurane | 733 | 0.29 | 5.6 | 0.25 | 173 | 0.27 | 99 |
| acetone | 766 | 0.30 | 5.2 | 0.19 | 300 | 0.20 | 212 |

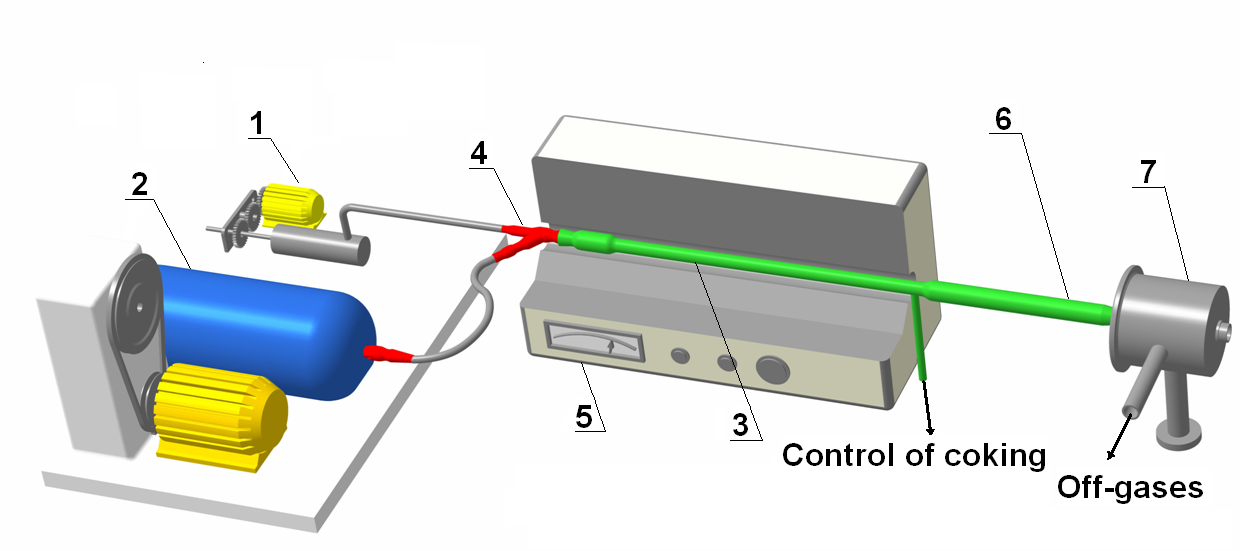


Fig.1. Scheme diagram of laboratory plant for nanoglobular carbon synthesis

1 - piston pump, 2 - compressor, 3 - quartz reactor, 4 - nozzle, 5 - electric furnace,

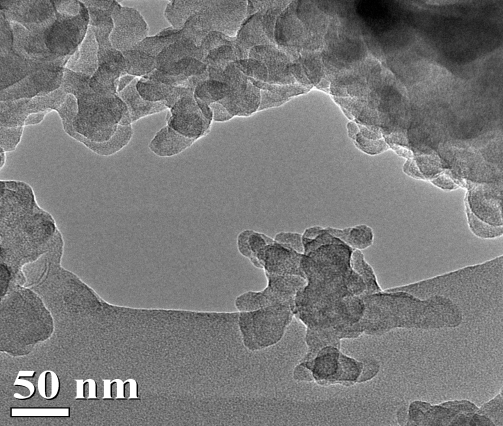
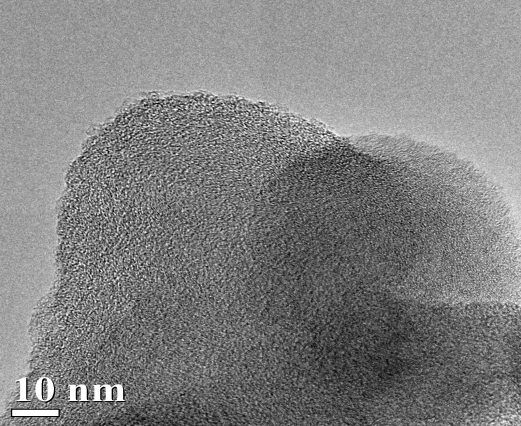
6 - air cooler, 7 - bag filter.

Catalytic gasoil with a high content of aromatic hydrocarbons and toluene were used as a raw material.

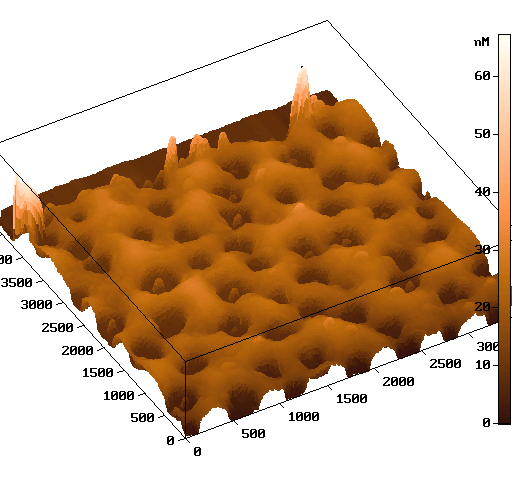
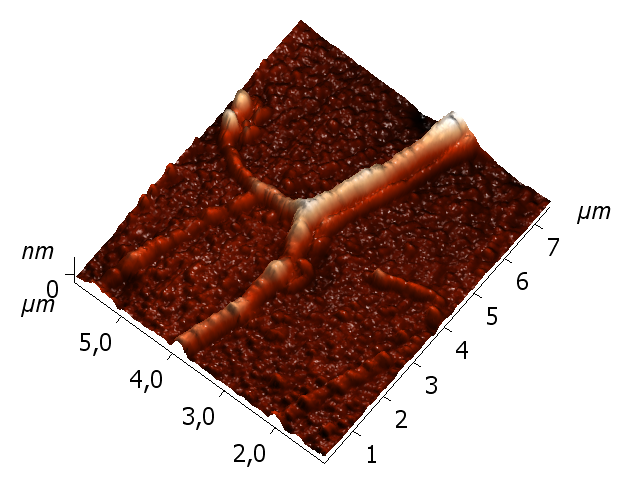
Modifying additives - polyethylenepolyamine and nitrogen-containing aromatic and heterocyclic compounds - were dissolved in the original hydrocarbon in an amount of 10 - 20% wt.

Table 1 Samples characteristics

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Modified additives | Quantity of additives, % wt. | Total nitrogen,  Kjeldahl,  % wt | SSP,  m2/g,  GOST 25699.2-90 | Iodine number, g/kg,  GOST 25699.3-90 | АDBP,  sm3/100g,  GOST 25699.5-90 |
| - | - | 0,2 | 46,6 | 74,2 | 96 |
| Aniline | 20 | 0,7 | 44,2 | 69,2 | 92 |
| Quinoline | 10 | 0,6 | 50,0 | 59,2 | 88 |
| Polyethylene polyamine | 20 | 1,2 | 52,4 | 60,8 | 70 |
| Cobalt phthalocyanine | 0,02 | 0,2 | 38,5 | 60,8 | 80 |
| Cobalt phthalocyanine | 0,1 | 0,4 | 39,3 | 54,2 | 90 |
| Cobalt phthalocyanine | 0,5 | 0,5 | 64,6 | 58 | 90 |

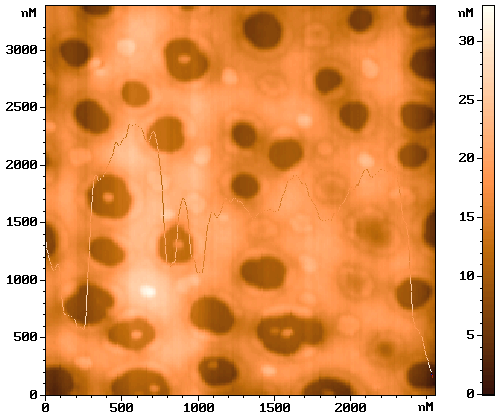
 

**Fig.2. TEM image of nanoglobular carbon from a toluene**



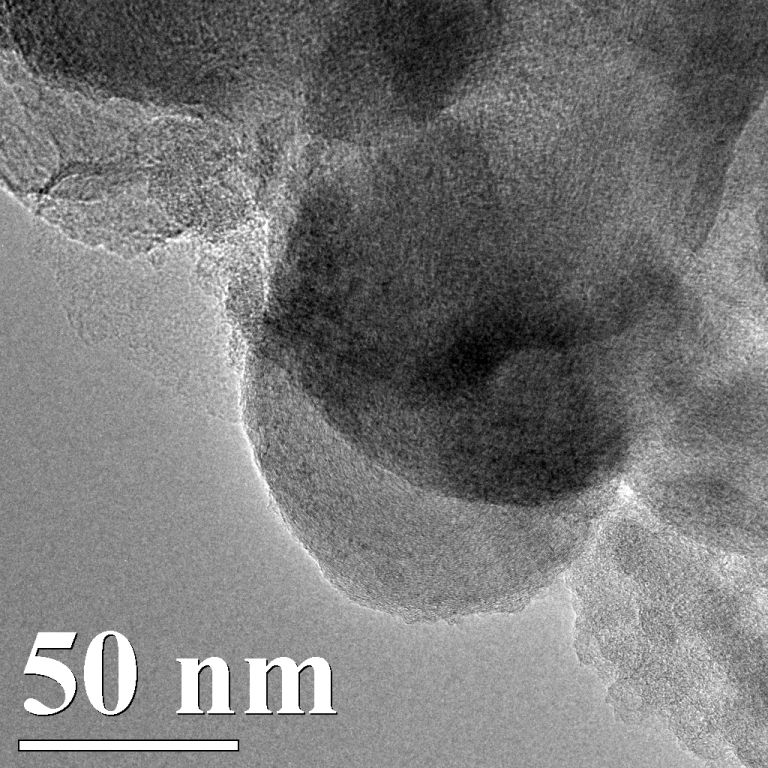
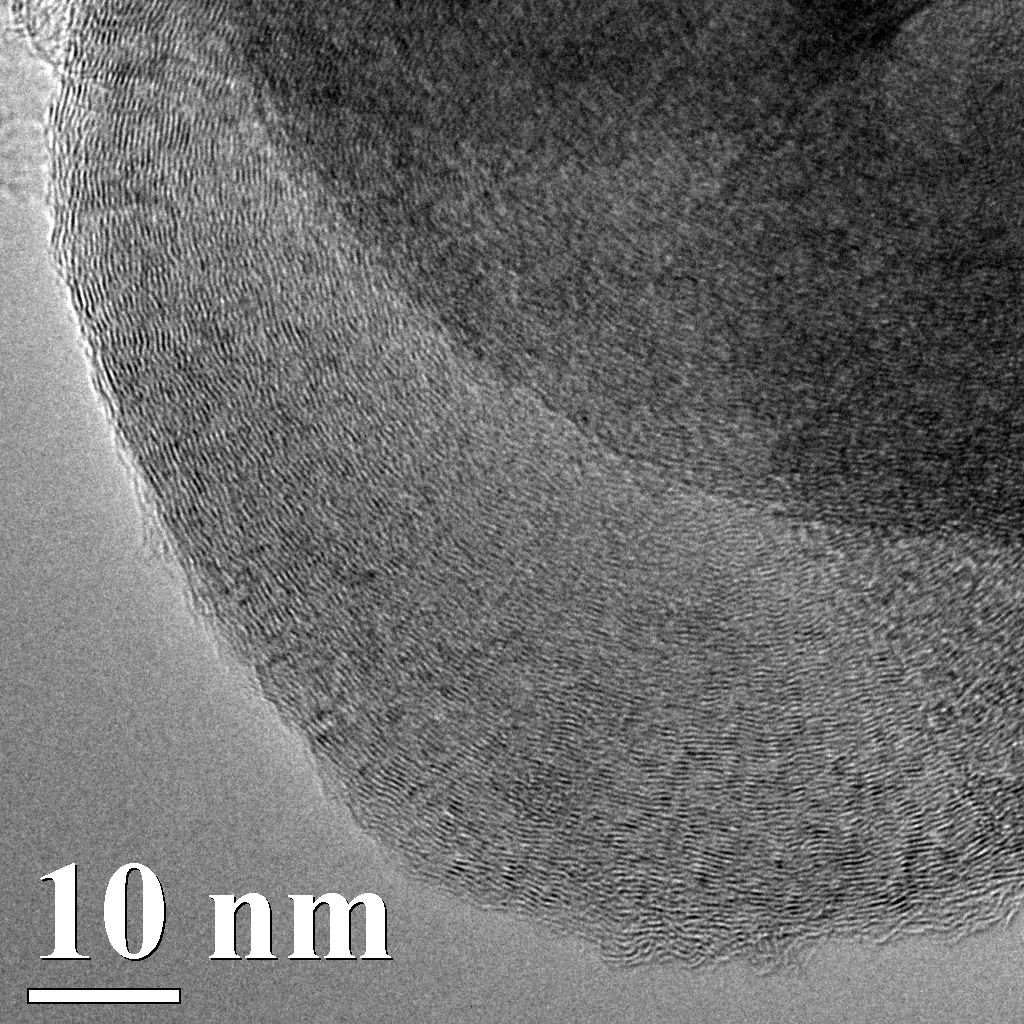
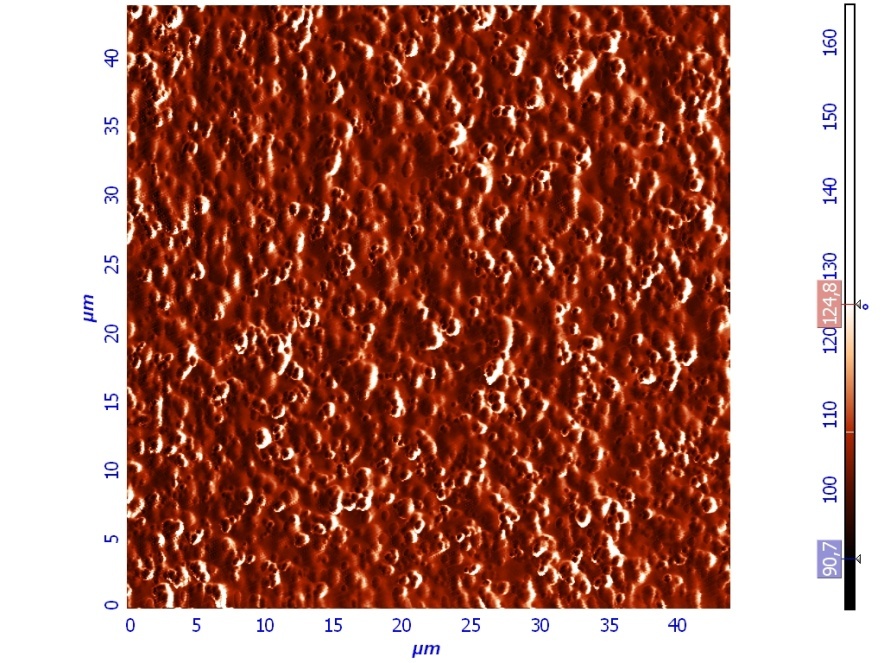
**Fig. 1. AFM analysis of carbon films: a) “openwork” carbon coating,**

**b) carbon-carbon composite with carbon nanotubes on thin carbon film.**



**Fig. 2. AFM images: a) “openwork” carbon coating, thin film 10 nm,**

**b) composite with carbon black nanoparticles distributed in carbon matrix.**



**Fig. 3. TEM images of carbon-carbon composite with carbon black**

**particles distributed in the amorphous carbon matrix**

**Table 2**. Composition and porous structure of carbon material based on polychlorovinylene and diethylamine (activation CO2, 900 °C)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Agent | N,  % wt | S BET,  m2/g | НК method | | Desorption branch | |
| Vmicro, сm3/g | D,  Å | Vmeso, сm3/g | Dmeso,  Å |
| КОН | - | 1100 | 0,37 | 8,5 | 0,35 | 50 |
| Diethylamine | 4,8 | 650 | 0,25 | 4,4 | 0,07 | 47 |