15 % (v/v) overnight. Then, it was filtered and washed several times with distilled water. Finally, the obtained crude fiber was dried in a vacuum oven at 40 °C for 24 hours.

4) Preparation of nanocellulose: The bleached raw cellulose was ground by a mill and then immersed in H_2SO_4 20 % (v/v) at 60 °C for 4 hours with a fiber ratio and acid sulfuric of 1/30 g/ml. Then, the suspension was washed 10 times with distilled water, allowed to settle overnight, and centrifuged at a speed of 10000 rpm for 10 minutes to remove excess H_2SO_4. Next, the obtained solid was dried in a vacuum oven at 80 °C for 24 hours. Finally, the dried powder was ground and sieved through a separation sieve. Nanocellulose was the powder that had been separated through the sieve. The nanocellulose extraction efficiency from durian peel was estimated to be in the range of 45 %.

The nanocellulose particles obtained from durian peel by alkaline treatment-acid hydrolysis have a length of 190 nm to 270 nm and a width of 42.96 nm.

Thus, agricultural waste - durian peel can be considered a source of raw materials for extracting nanocellulose. With this method, not only can valuable products be recovered, but also helps to solve a large amount of solid waste from the agricultural industry that is polluting the environment.

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LASER IRRADIATION OF MOLYBDENUM DISULFIDE FOR ENHANCED PHOTOCATALYTIC DIMERIZATION OF 4-NITROBENZENETHIOL

Tuan-Hoang Tran[1], Raul D. Rodriguez[1], Nelson E. Villa[1],
Sergey Shchadenko[1], Andrey Averkiev[1], E. S. Sheremet[1]
Scientific advisor – PhD, Professor RSChABS, Raul D. Rodriguez[1]

[1]National research Tomsk polytechnic university
634050, Tomsk, 30 Lenina ave., tuanhoang1@tpu.ru, §esheremet@tpu.ru

Since the discovery of graphene, two-dimensional (2D) materials have become attractive not only in fundamental research but also in practical applications. Molybdenum disulfide (MoS_2) is in the second place of most studied 2D materials, behind only graphene, and attracts enormous interest for its potential use in catalysis, optoelectronics, and energy applications. MoS_2 possesses unique properties, for instance, the transition from indirect to direct bandgap with decreasing the thickness to monolayer of MoS_2 [1]. Different approaches: e-beam, chemical doping, laser irradiation, etc. were employed to modify the structure and properties of MoS_2 for specific applications. Laser is still a preferential method thanks to its universal properties: scalability, spatial patterning, inexpensiveness, etc. and this is proven by the large number of works published in the last decade. Previous works showed that high-power laser irradiation allows the spatial carving and thinning of MoS_2 layers [2, 3]. However, the mechanism of laser irradiation on MoS_2 has not been elucidated yet. The physical mechanism behind MoS_2 light-sculpting is proven to be dominated by the photothermal contribution and not by photochemical effects. Replicating the light-carving process using substrates with different thermal conductivities further confirmed the dominant role of photothermal heating. High-density laser irradiation made the free-form activation of MoS_2 patterns possible. We exploited the chemically activated laser-processed MoS_2 layers to form $Ag–Ag_2S–MoS_2$ nanostructures. Additional functionalization with 4-nitrobenzenethiol (4-NBT) self-assembled monolayers showed photocatalytic activity, reaching 100 % yield for the conversion to dimercaptoazobenzene. These new insights extend our understanding of light-induced modification of MoS_2 properties and other graphene-like semiconductors with a high degree of spatial control, which could be used in developing new optoelectronic systems and nano-engineered catalytic materials.

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INVESTIGATION OF THE KALININGRAD REGION OIL GENESIS

A. V. Vatagina, Ya. A. Masyutin
Scientific director – PhD in Chemistry, associate professor Ya. A. Masyutin
Linguist – student A. V. Vatagina, PhD in Chemistry, associate professor Ya. A. Masyutin

Immanuel Kant Baltic Federal University
236016, Kaliningrad, 14 A. Nevskogo ul., post@kantiana.ru

The Baltic shield, the northwestern part of the Russian platform, has long attracted the attention of geologists. Geological studies have been conducted on the territory of the Kaliningrad Region since the middle of the XX century (Figure 1).

All the onshore deposits in the Kaliningrad region are classified as small ones, but the quality of oil produced from these fields is one of the highest in Russia.

To understand the overall picture of the Baltic oil and gas province, a number of analyses were carried out to study the physical and geochemical parameters of oil. One of the most important physical and chemical indicators is the fractional composition, which was established according to GOST 2177-99 (ISO 3405-88). In accordance with the experimental data, it can be concluded that diesel and fuel oil fractions predominate in the oil samples of the Kaliningrad region, but the total share of light petroleum fractions is more than 50% by weight.

Moreover, oil samples were examined for the isotopic composition of carbon (Table 1).

Based on the analysis, offshore and onshore oil samples were formed from organic matter of continental origin. This conclusion is also confirmed by the pristane/phytane ratios obtained using GC-MS. The values of isoprenoid coefficient demonstrate significant predominance of n-alkanes over branched isoprenoids (figure 2).

All the studied oils of the Baltic Shield can be attributed to type A1 according to the classification of Al. A. Petrov, oil-source formation of continental origin that makes them valuable for processing since they contain up to 60 % wt. alkanes, and n-alkanes account for 25–30 % of the total alkanes. Such oils mainly contain weakly branched alkanes.

Table 1. ^{13}C isotope content in oil samples

Names of fields	δ ^{13}C ‰				
	Oil	SAT	ARO	POL	ASP
Krasnoborskoye	–30.6	–31.0	–30.3	–30.2	–29.9
Ladushkino	–30.6	–30.9	–30.1	–30.0	–30.1
D6	–30.6	–31.0	–30.2	–29.8	–30.2
D33	–30.5	–31.0	–30.5	–30.0	–30.2