

Урок 1. About Myself

Упр. 1. Прочитайте и запомните следующие слова и выражения:

Black Sea coast – побережье Черного моря
a first-year student – студент(ка) первого курса
region – область
appearance – внешность
career – карьера
gymnastics – гимнастика
mathematician – математик
housewife – домохозяйка
chance – случай, шанс
the Netherlands – Нидерланды
the United Kingdom – Соединенное Королевство (Великобритания)
slim – стройная
several – несколько
kind – добрый
to introduce – представлять, знакомить
to do well – зд. успевать

Упр. 2. Прочитайте и переведите текст на русский язык.

About Myself

Hello, friends. Let me first introduce myself. My name is Ann or Anya for my friends. My surname or last name is Sokolova. I was born on the 2nd of October in Sochi, Krasnodarsky Krai. This is the most beautiful city in Russia situated on the Black Sea coast. Now I am a first-year student at the Technical Academy. In five years I'll be an engineer.

Now let me describe my appearance. I am tall and slim and have fair hair and blue eyes. My friends say that I am pretty. I think I am just good-looking. I love sports and music. I was very serious about a career in gymnastics when I was in the 5th form. But then I broke my arm and doctors didn't let me go in for gymnastics. I love to listen to modern music and dance. I dance a lot and I hope I am good at it. I also love swimming. I always swim in the Black sea when I visit my parents, my dear family.

I would like to tell you about my family. There are five people in our family. My father's name is Vladimir Stepanovich. He is a mathematician by education and businessman by profession. My mother's name is Tatyana Petrovna. She is a housewife. She has much work about the house because I have a younger sister. She is a pupil. My sister Natasha is in the fifth form. My grandmother, my mother's mother, lives with us. She is very kind and helps us a lot.

Our family is very friendly, we have many friends. In summer many relatives come to visit us. And, of course, they use a chance to spend several weeks in beautiful Sochi.

In May I finished school No 5 in Sochi. I did well in all the subjects but my favourite subjects at school were Physics and Computer Science. I also enjoyed English lessons.

I am very interested in learning English because I always wanted to become a programmer or maybe a businesswoman. I also think that the knowledge of foreign languages helps in everyday life and career.

Two years ago I travelled much around Europe. I have visited France, Germany, Belgium, the Netherlands and the United Kingdom. There the knowledge of English helped me a lot.

Упр. 3. Составьте план к тексту.

Упр. 4. Ответьте на вопросы к тексту.

- 1) What is the girl's name and surname?
- 2) Where and when was she born?
- 3) What is she now?
- 4) What will she be in five years?
- 5) Describe her appearance.
- 6) What does Ann love?
- 7) What can you say about Ann's family?
- 8) Speak about Ann's schooling.
- 9) Where did she travel two years ago?

Упр. 5. Пополните свой активный словарь по теме "About Myself" следующими словами. Составьте с этими словами мини-высказывания о своих знакомых, друзьях, родных и т.д.

Образец: I have a younger brother. He is a tall, slim boy with fair hair and grey eyes. I think he is smart but sometimes boring. In general my younger brother is easy to go along.

tall – высокий

short – маленького роста

stout – приземистый, коренастый

slim – стройный

fat – толстый

plump – полный

fair hair – светлые волосы

blonde – блондин(ка)

brunette – брюнет(ка)

gray hair – седые волосы

bold headed – лысый

short sighted – близорукий

smart, clever, bright – умный (я)
stupid – тупой, глупый
boring – скучный
fun to be with – веселый человек
easy-going – легкий в общении
down to earth – простой человек
quiet – спокойный
impulsive – порывистый, импульсивный
aggressive – агрессивный
rude – невежливый, грубый
shy, confused – застенчивый
active – активный
talkative – разговорчивый
enthusiastic – энтузиаст, затейник

Упр. 6. Расскажите о себе, используя материал упр. 3, 4, 5 и следующие вопросы:

- 1) What is your name?
- 2) Where and when were you born?
- 3) How old are you?
- 4) Have you got a family?
- 5) How many people are there in your family?
- 6) Do you have brothers, sisters, grandparents in your family?
- 7) Where do you live?
- 8) Did you study well at school?
- 9) What school did you finish?
- 10) Did your teacher of English help you to choose your future profession?
- 11) What was your favourite subject?
- 12) What do you like to read?
- 13) What sport do you go in for?
- 14) What are you going to be?
- 15) Do you still live with your parents?
- 16) Do you have a girlfriend / boyfriend?

Упр. 7. Расскажите о родном или знакомом вам человеке, используя его/ее фотографию. Не забудьте использовать лексику данного урока.

Урок 2. My Working Day

Упр. 1. Прочитайте и запомните следующие слова и выражения:

housing – жилье

opportunity – возможность
dormitory, students hostel – студенческое общежитие
week-days – будние дни
alarm clock – будильник
roommate – сосед по комнате
make up – макияж
break – перерыв
report – доклад
canteen – столовая (студенческая)
healthy – здоровый, полезный
usually – обычно
rather – довольно
enough – достаточно
completely – полностью, совершенно
while – пока, в то время как
successfully – успешно
to rent a flat (an apartment) – снимать квартиру
to share – делить(-ся)
to turn on (off) – включать, выключать
to serve – обслуживать
to prefer – предпочитать
to miss – пропускать
to get dressed – одеваться
to gossip – сплетничать
to have to be back – должны вернуться

Упр. 2. Прочитайте и переведите текст на русский язык.

My Working Day

Hi again,.. As you already know, I am a first-year student of the Technical Academy. My parents live in Sochi and I study in Rostov-on-Don so I need some housing. There are two opportunities for me: I can live in a dormitory (a students hostel), or to rent a flat (an apartment).

I decided to rent a flat. To make the rent smaller, I also decided to share my flat with another girl — Natasha Kozlova. She studies at the Academy, too, and she is my best friend now.

Now, let me describe my usual working day. My classes begin at 8:30 a.m. So on week-days I have to get up at 7:15 a.m. I don't have an alarm clock and usually my roommate wakes me up and my working day begins. I turn on the radio and do my morning exercises while Natasha takes a shower. I don't take a bath in the morning because I don't have enough time for it. I take a cool shower (that's when I completely wake up), brush my teeth. After that I go back to our room and get dressed. I brush my hair and put on a light make-up. Then we have breakfast.

Natasha makes breakfast every Monday, Wednesday and Friday. I have to serve breakfast on Tuesdays, Thursdays and Saturdays. I love to listen to the latest news on the radio while I am eating and Natasha prefers light music.

We leave the house at ten minutes past eight and walk to the nearest bus stop. We live rather far from the Academy and it usually takes us about a quarter of an hour to get there by bus. Sometimes when the weather is fine and we have enough time we walk to the Academy. It is very healthy to walk much.

The classes begin at 8:30 in the morning and they end at 2:00 p.m. We have lectures in different subjects. As a rule we have three or four classes a day. Sometimes it is very hard to wait till they end.

Usually I don't miss my classes because I want to pass my exams successfully. But sometimes I do, especially when the weather is fine and the classes are boring.

At 11:50 a.m. we have lunch. That's my favourite time. That is the time to share the latest news and to gossip. My friends and I prefer not to go to the canteen and we often have lunch in a small cafe not too far from the Academy. At 12:30 p.m. we have to be back to our classes. During the working day we also have several short breaks that last for ten minutes.

Occasionally I have to stay at the Academy till 5 or even 6 o'clock in the evening because I go to the library to get ready for my practical classes or to write a report. As a rule I have no free time on week-days. So by the end of the week I get very tired.

We come home at about 7 o'clock in the evening. We eat supper together and share the latest news.

After supper we wash dishes, drink coffee or tea and watch TV. I prefer old comedies and Natasha likes serials or films about travelling. Sometimes Natasha and I go for a walk in the park or visit our friends.

At about eleven at night I go to bed. I like to read something before going to bed and Natasha likes to listen to some music. Sometimes I fall asleep while I am reading and Natasha gets up and switches off the light and says — Good night!

Упр. 3. Составьте план к тексту.

Упр. 4. Ответьте на вопросы к тексту.

- 1) What does Ann need and why?
- 2) What opportunities are there for her?
- 3) What did Ann decide to do?
- 4) Describe Ann's usual week-day morning.
- 5) How does she get to the Academy?
- 6) When do Ann's classes begin and end?
- 7) How many classes a day does Ann have as a rule?
- 8) Does she miss her classes? Why?
- 9) What is her favourite time of the day? Why?

- 10) When does Ann have to be back to her classes?
- 11) Why does she occasionally have to stay at the Academy till 5 or even 6 in the evening?
- 12) What does Ann do when she comes home at 7 o'clock?

Упр. 5. Расскажите о своем обычном дне, используя материал упр. 3, 4, следующие вопросы и дополнительную лексику.

tape-recorder – магнитофон

to brush one's hair – причесывать волосы

it takes me... minutes to get to the Academy by bus – у меня уходит... минут, чтобы добраться до академии на автобусе

cloakroom – гардероб

upstairs – наверху, вверх по лестнице

downstairs – внизу, вниз по лестнице

to miss classes – пропускать занятия

to pass exams – сдать экзамены

to do well – делать успехи, хорошо учиться

for the first (second) course – на первое (второе) блюдо

to get ready – подготовиться

as a rule – как правило

to get tired – устать

to take pleasure in – получать удовольствие от...

to look forward to – ждать с нетерпением

acquaintance – знакомый

- 1) Do you get up early?
- 2) Is it easy for you to get up early?
- 3) Do you wake up yourself or does your alarm-clock wake you up?
- 4) Do you do your morning exercises?
- 5) What do you prefer: a hot or a cold shower in the morning?
- 6) How long does it take you to get dressed?
- 7) What do you usually have for breakfast?
- 8) Some people look through newspapers or listen to the latest news on the radio while having breakfast. What about you?
- 9) When do you usually leave your house?
- 10) Do you work? If yes, where?
- 11) How long does it take you to get to your University (Institute)? Do you go there by bus/trolley-bus or walk?
- 12) Where do you usually have lunch (dinner)?
- 13) What time do you come home?
- 14) How long does it take you to do your homework?
- 15) How do you usually spend your evenings?
- 16) Do you have a lot of free time?
- 17) Do you play any musical instrument?

- 18) Are you fond of listening to music?
- 19) What kind of music do you prefer?
- 20) Do you collect anything (stamps, records, post cards, coins, matchboxes, etc.)?
- 21) What time do you usually go to bed?

Упр. 6. Расскажите:

- а) о рабочем дне ваших папы и мамы;
- б) об обычном выходном в вашей семье;
- в) о лучшем дне в вашей жизни;
- г) о празднике, который вы провели в кругу друзей или среди родственников (Новый год, Рождество, 8 Марта и др.);
- д) о рабочем дне известных людей (писателей, артистов, политиков и др.).

Урок 3. Ivanovo

Упр. 1. Прочитайте и запомните следующие слова:

pool – бассейн
route – маршрут, путь
tributary – приток
census – перепись
government – правительство
enterprise – предприятие
merchant – купец
convent – монастырь
neighbor – сосед
trade – торговля
plant – завод, фабрика
opportunity – возможность
event – событие
palette – палитра
fair – ярмарка
affiliate – филиал
competition – соревнование
princely – царственный
latter – последний
famous – известный, знаменитый
former – бывший
numerous – многочисленный
flax-processing – льнообрабатывающий
sewing – швейный
entertainment – развлекательный

various – различный
current – текущий
worth – заслуживающий, стоящий
annual – ежегодный
probably – вероятно
unlike – в отличие от
approximately – примерно
considerably – значительно
almost – почти
to locate – располагаться
to mention – упоминать
to merge – соединять
to consider – считать, полагать
to receive – получать
to decline – уменьшаться, приходить в упадок
to remain – оставаться
to reduce – сокращаться
to take place – иметь место, происходить

Упр. 2. Прочитайте и переведите текст на русский язык.

Ivanovo

Ivanovo is located in the picturesque places of the Volga pool of the Central Federal district of Russia, at a distance of 254 kilometers from Moscow, on the route of the Golden ring of Russia. The Uvod River, a tributary of the Klyazma, flows from north to south, dividing the city into two halves. There are also two rivers in Ivanovo: the Talka and the Kharinka. Ivanovo is an administrative, industrial and cultural center of Ivanovo oblast (region). The city is also known as “the city of brides”, “the land of printed cotton”, “Russian Manchester”, “Red Manchester”. Ivanovo has been called the Russian textile industry capital for hundreds of years. The population of Ivanovo is approximately 409,000 (census 2012), land area - 105 square kilometers.

The city is first mentioned in 1561, when it was given to the Cherkassky princely family by Ivan the Terrible, after the latter's marriage to Maria Cherkasskaya. The modern city was created by merging the old flax-processing village Ivanovo with the industrial Voznesensky Posad in 1871. Yakov Garelin—a patron of arts, historian, manufacturer, and public figure—is considered to be the founder of the city and its first head. Under his government, the city began to develop, industrialise, and grow. Being the city with numerous factories Ivanovo was the place of high revolutionary activity and in May 1905 probably the first Soviet in history was created there (Ivanovo Soviet).

In 1918, the city received the status of guberniya (region) administrative center. In 1932, the city received its current name - Ivanovo. After the war, along with the continued textile industry in Ivanovo engineering and other industries

developed. Since the beginning of the 21st century there has been declining production in Ivanovo. In the first decade of the century, a large number of enterprises were closed.

Ivanovo is famous first of all by the monuments of constructivism epoch (the 30s of the 20th century): the-ship-house, the-horseshoe-house and the like. There are a lot of historical and revolutionary monuments in the city which make it rather specific. The historical center of Ivanovo is interesting by its former merchants' houses of the 19th and the early 20th centuries.

Among the other places of interest worth mentioning is Shudrovskaya palatka constructed in the 17th century and St.-Vedensky convent, the main part of which was built in the early 20th century. Ivanovo, unlike its neighbors (Vladimir, Yaroslavl, Kostroma), developed first of all as an industrial center (several textile plants of the 19th century remained almost unchanged), that's why there are a lot of plants on the territory of the city. At present trade and service industries are rapidly developed. There are also opportunities for tourism development.

The city was traditionally considered the center of the Russian textile industry. The first textile plants came into being in the 17th century. Nowadays the number of textile plants considerably reduced, but there are a lot of sewing plants. Food industry is being developed. There are a lot of various trade and entertainment centers in the city.

Cultural and entertainment events of Ivanovo city are:

- Andrey Tarkovsky International Film Festival "Zerkalo" (Mirror) - the festival which takes place since 2007 at every end of May;
- The annual Russian Fashion Festival "Plyos on the Volga. Flax Palette" (takes place in the town of Plyos);
- The annual patriotic holiday "An Open Air" usually celebrated in August at the airport "Severny" (Northern);
- Ivanovo City Day - the annual celebration of the date when Ivanovo received the status of the city, at present it takes place on the last Saturday of May; the central streets of the city are decorated by this day; fairs, concerts and competitions are held and fireworks finish the holiday.

There are many educational centers in Ivanovo. Among them are secondary schools, lyceums, classical schools, colleges, etc. Ivanovo is also known as "the students' town". Young people of our region and from other parts of Russia have wide opportunities to study in several educational institutions of higher learning: Ivanovo State University, Ivanovo State Polytechnic University, Ivanovo State University of Chemistry and Technology, Ivanovo Medical Academy, Ivanovo State Agricultural Academy, Ivanovo State Power University and also several affiliated institutions.

Упр. 3. Составьте план к тексту.

Упр. 4. Ответьте на вопросы к тексту.

- 1) Where is Ivanovo located?
- 2) Which rivers flow through Ivanovo?
- 3) What names are given to Ivanovo?
- 4) What is the population of the city?
- 5) Why is it called the Russian textile industry capital?
- 6) What can you say about the history of Ivanovo city?
- 7) How did it change in the soviet epoch?
- 8) What changes did the city face after the war and in the beginning of the 21st century?
- 9) What monuments is Ivanovo famous for?
- 10) What places of interest in Ivanovo can you mention?
- 11) What industries are developed in the city nowadays?
- 12) Enumerate cultural and entertainment events of Ivanovo?
- 13) What can you say about the education system of Ivanovo?

Упр. 5. Расскажите о своем родном городе, используя материал упр. 2, 3, 4 и следующие вопросы:

- 1) What is your hometown?
- 2) Do you study in your hometown or you live here while studying?
- 3) Do you like the town where you study? Why and why not?
- 4) Is it a large or a small town?
- 5) Is it a regional or a district town?
- 6) Is it a big industrial and business centre?
- 7) Do you know the history of your hometown?
- 8) When was your hometown founded?
- 9) Do you know any famous people who were born in your hometown?
- 10) Are there many historical places in it?
- 11) What are the places of interest in your hometown?
- 12) Are there many plants, offices in it?
- 13) What educational institutions are there in your hometown?
- 14) Which is the highest building?
- 15) Which is the most beautiful street in your hometown?
- 16) What street do you live in?
- 17) What is your favourite place your hometown?
- 18) What else can you say about your hometown?

Урок 4. My Speciality is Nanotechnology

Упр. 1. Прочитайте и запомните следующие слова:

nanotechnology – нанотехнология

nanoscience – нанонаука

ability – способность
matter – материя
heat – тепло
nanoscale – наноуровень
size – размер
application – применение
device – устройство
invention – изобретение
properties – свойства
durability – прочность
drugs – лекарства
nanostructured – наноструктурный
approximately – приблизительно
to enable – делать возможным
to behave – вести себя
to involve – вовлекать
to conduct – проводить
to reflect – отражать
to alter – изменять
to manipulate – управлять
to rearrange – перестраивать
to create – создавать

Упр. 2. Какие русские слова имеют те же корни, что и следующие английские слова. Запомните их произношение в английском языке:

speciality, polytechnic, university, theoretical, nanotechnology, business, finance, microbiology, ecology, graphics, control, electricity, plastic, atom, molecule, chemical, biological, physical, material, magnetic, specialist, individual, manipulate, product, energy.

Упр. 3. Найдите в словаре и запишите значения следующих слов и выражений:

state, research, in order to, knowledge, gain, education, curriculum, broad, to acquire, extensive, science, to deliver, experience, advanced, applied, foreign, huge, impact, science, society, to compare, unique, change, doubt, obtain, broad, to include, subject, to gain, extensive, experience, to take part in, useful, imperfection, efficient, side effect, source.

Упр. 4. Прочитайте и переведите текст на русский язык.

My Speciality is Nanotechnology

I'm a first year student of Ivanovo State Polytechnic University. My speciality

is Nanotechnology. Nanotechnology – the ability to control matter at the nanoscale (approximately 1 to 100 nanometers) – is having a huge impact on science, engineering, and technology because matter behaves differently at that size. The impact of nanotechnology on society has been compared to the invention of electricity or plastic. Nanotechnology and nanoscience involve the ability to see and to control individual atoms and molecules. At nanoscale, matter has unique physical, chemical, and biological properties that enable new applications. Some nanostructured materials are stronger or have different magnetic properties; some are better at conducting heat or electricity, or may become more chemically reactive, reflect light better, or change color as their size or structure is altered. No doubt, nanotechnology is going to be the future of the world.

The students of this speciality obtain a broad general education and major in nanoscience and physics. In order to become good specialists we study many theoretical and special subjects. The curriculum includes mathematics, physics, strength of materials, nanoscience and others. Good knowledge of these subjects will help our graduates in their future work. Specialization begins in the third year of study.

Students can acquire an extensive knowledge of nanoscience at the lectures delivered by experienced teachers, at practical classes and reading special literature on nanotechnology and physics. Some students take part in research in the field of nanoscience. With nanotechnology, individual atoms and molecules can be manipulated and rearranged to create useful materials, devices, and systems. With this manipulation, products can be made with fewer imperfections and more durability, drugs can be more efficient and have fewer side effects, and energy sources can be cleaner, etc. The knowledge gained at the University will help students in their future work.

Упр. 5. Подберите подходящий перевод к английским словам и выражениям.

1) to have a huge impact on; 2) broad general education; 3) to deliver lectures; 4) major education in nanoscience; 5) take part in research.

а) читать лекции; б) основное образование в области нанонауки; в) принимать участие в научном исследовании; г) оказывать огромное влияние на; д) углубленное изучение общеобразовательных предметов.

Упр. 6. Расположите предложения согласно последовательности изложения.

- 1) My specialty is nanotechnology.
- 2) I'm a first year student of Ivanovo State Polytechnic University.
- 3) The students of this speciality obtain a broad general education and major in nanoscience and physics.
- 4) In order to become good specialists we study many theoretical and special subjects.

Упр. 7. Составьте план к тексту.

Упр. 8. Ответьте на вопросы более чем одним высказыванием.

- 1) What are you?
- 2) What is your speciality?
- 3) Why is the speciality of nanotechnology so important nowadays?
- 4) What do the students of this speciality do in order to become good specialists?
- 5) What do they obtain and acquire?

Упр. 9. Перескажите текст по-английски, используя материал упр. 5, 6, 7, 8.

Урок 5. Nanotechnology

Упр.1. Прочитайте и запомните следующие слова и выражения:

nanotechnology – нанотехнология

dimension – измерение

confinement – ограничение

nanometer – нанометр

alter – изменять

interaction – взаимодействие

ductile – ковкий, пластичный

catalyst – катализатор

verify – проверять

molecule – молекула

implications – последствия

atom – атом

layer – слой

solid – твердое тело

scale – уровень

to deal with – иметь дело с

diverse – разнообразный

extension – расширение

range – спектр

toxicity – токсичность

speculation – предположение

to warrant – гарантировать

effect – действие

Упр.2. Прочитайте и переведите текст на русский язык:

Nanotechnology

Nanotechnology, shortened to “nanotech”, is the study of the controlling of matter on an atomic and molecular scale. Nanotechnology deals with structures of the size 100 nanometers or smaller in at least one dimension, and involves developing materials or devices within that size. Nanostructures are assembled out of a single atom, molecule, or atomic layer at a time, as part of a vast new field of research in nanomaterials synthesis and assembly.

Generally, structures smaller than a nanometer tend to behave much like individual atoms, while materials that are hundreds of nanometers or greater in size exhibit properties of the continuum. Nanoscale properties and behaviors can be quite different as the result of unique physical and chemical interactions. The preponderance of surfaces and interfaces, and the physical confinement of matter and energy, can alter nearly all properties of materials (physical, chemical, optical, etc.), and thus produce extraordinary new behaviors. Examples include generating light from dark materials, improving efficiencies of catalysts by orders of magnitude, and turning soft and ductile materials like gold into solids with hardness equivalent to bearing steel.

The final ingredient to nanotechnology is the ability to characterize and predict nanoscale properties and behavior. New experimental tools that are able to “see”, “touch”, and measure the behavior of individual nanostructures allow scientists and engineers to identify subtle differences in structure and properties that control nanoscale properties. By coupling new experimental techniques with advanced computational tools, researchers can develop, verify, and refine models and simulations that will allow the full potential for nanotechnology to be explored.

There has been much debate on the future implications of nanotechnology. Nanotechnology has the potential to create many new materials and devices with a vast range of applications, such as in medicine, electronics and energy production. On the other hand, nanotechnology raises many of the same issues as with any introduction of new technology, including concerns about the toxicity and environmental impact of nanomaterials, and their potential effects on global economics, as well as speculation about various doomsday scenarios. These concerns have led to a debate among advocacy groups and governments on whether special regulation of nanotechnology is warranted.

Упр.4. Определите, каким частям текста соответствуют данные заголовки:

- a. Nanoscale properties and behaviors;
- b. Future of nanotechnology;
- c. Assembling of nanostructures;
- d. Characterizing and predicting of nanoscale properties and behavior.

Упр.5. Переведите на русский язык:

Atomic and molecular scale, nanometer, to assemble, the preponderance of surfaces and interfaces, the physical confinement of matter and energy, to alter, nearly, by order of magnitude, soft and ductile materials, bearing steel, to verify, to refine, implication, to raise issues, environmental impact, doomsday scenarios.

Упр.6. Выберите правильный перевод:

- | | |
|---|---|
| 1. На атомном и молекулярном уровне | a) to improve efficiencies of catalysts |
| 2. иметь дело со структурами размером в 100 миллимикрон | b) as the result of physical and chemical interaction |
| 3. как результат химического и физического взаимодействия | c) on an atomic and molecular scale |
| 4. изменять химические и физические свойства материалов | d) to deal with structures of the size 100 nanometers |
| 5. улучшать эффективность катализаторов | e) to alter physical and chemical properties of materials |
| 6. вырабатывать свет | f) to characterize and predict properties of nanostructures |
| 7. превращать пластичные материалы в твердые | g) to generate light |
| 8. исследовать весь потенциал нанотехнологии | h) to turn ductile materials into solids |
| 9. характеризовать и предсказывать свойства наноструктур | i) effects of nanomaterials on global economics |
| 10. действие наноматериалов на глобальную экономику | j) to explore the full potential of nanotechnology |
| 11. широкий спектр применения наноматериалов | k) concerns about the toxicity of nanomaterials |
| 12. беспокойства по поводу токсичности наноматериалов | l) a vast range of applications of nanomaterials |

Упр.7. Скажите, верны ли следующие высказывания:

- 1) Nanotechnology is creating an entirely new class of materials and devices with unique and potentially very useful properties.
- 2) The physical dimensions of nanotechnology are small, spanning from just a few to tens of nanometers.
- 3) Nanotechnology is very diverse, ranging from extensions of conventional device physics to completely new approaches based upon molecular self-assembly,

from developing new materials with dimensions on the nanoscale to investigating whether we can directly control matter on the atomic scale.

- 4) Nowadays current interest in nanotechnology is not high.
- 5) The field of nanotechnology is developing slowly as are its practical application.
- 6) Unique nanoscale properties are already being used to increase energy efficiency and improve healthcare

Упр.8. Ответьте на вопросы:

- 1) What is nanotechnology?
- 2) What does nanotechnology deal with?
- 3) Which properties do materials hundreds of nanometers in size exhibit?
- 4) What is the final ingredient to nanotechnology?
- 5) What is the application of nanotechnology

Урок 6. The History of Nanotechnology

Упр.1. Запомните следующие слова:

individual atoms – одиночные атомы

semiconductor – полупроводник

fullerenes – фуллерены

nanoparticles – наночастицы

oxide – окись

van der Waals attraction – Ван-дер Ваальсовы силы

gravity – сила тяжести

carbon nanotubes – углеродные нанотрубки

magnitude – величина

nanocrystals – нанокристаллы

Упр.2. Прочитайте и переведите текст:

The History of Nanotechnology

The first use of the concepts found in 'nanotechnology' (but predating use of that name) was in a talk given by physicist Richard Feynman at an American Physical Society meeting at Caltech on December 29, 1959. Feynman described a process by which the ability to manipulate individual atoms and molecules might be developed, using one set of precise tools to build and operate another proportionally smaller set, and so on down to the needed scale. In the course of this, he noted, scaling issues would arise from the changing magnitude of various physical

phenomena: gravity would become less important, surface tension and van der Waals attraction would become increasingly more significant, etc. This basic idea appeared plausible. The term "nanotechnology" was defined by Tokyo Science University Professor Norio Taniguchi in a 1974 paper as follows: 'Nanotechnology' mainly consists of the processing of, separation, consolidation, and deformation of materials by one atom or by one molecule." In the 1980s the basic idea of this definition was explored in much more depth by Dr. K. Eric Drexler, who promoted the technological significance of nanoscale phenomena and devices through speeches and the books "Engines of Creation: The Coming Era of Nanotechnology" (1986) and "Nanosystems: Molecular Machinery, Manufacturing, and Computation", and so the term acquired its current sense. "Engines of Creation: The Coming Era of Nanotechnology" is considered to be the first book on the topic of nanotechnology. Nanotechnology and nanoscience got started in the early 1980s with two major developments; the birth of cluster science and the invention of the scanning tunneling microscope (STM). This development led to the discovery of fullerenes in 1985 and carbon nanotubes a few years later. In another development, the synthesis and properties of semiconductor nanocrystals was studied; this led to a fast increasing number of metal and metal oxide nanoparticles and quantum dots. The atomic force microscope (AFM or SFM) was invented six years after the STM was invented. In 2000, the United States National Nanotechnology Initiative was founded to coordinate Federal nanotechnology research and development and is evaluated by the

Упр.3. Прочитайте и переведите следующие слова и словосочетания:

Predating use, a set of precise tools, arising of scaling issues, physical phenomena, surface tension, increasingly, to appear plausible, to define the term, to acquire, research and development.

Упр.4. Найдите в тексте английские соответствия следующим словосочетаниям:

Определять термин «нанотехнология»; процесс деформации и разделения материалов атомом или молекулой; привести к открытию фуллеренов; увеличение количества металлов; управлять одиночными атомами; координировать нанотехнологические исследования; отмечать технологическую значимость наноприборов.

Упр.5. Скажите, верны ли следующие утверждения:

- 1) The term 'nanotechnology' was first defined by physicist Richard Feynman in the USA.
- 2) The term 'nanotechnology' acquired its current sense in the 1980s.
- 3) The birth of cluster science and the invention of the scanning tunneling microscope prompted the start of nanoscience.

- 4) The study of the synthesis and properties of semiconductor nanocrystal led to the discovery of fullerenes and carbon nanotubes.
- 5) The scanning tunneling microscope was invented six years earlier than the atomic force microscope.

Упр.6. Ответьте на вопросы:

- 1) What did Richard Feynman describe at an American Physical Society on December 29, 1959?
- 2) How was the term 'nanotechnology' defined by Professor Norio Taniguchi in 1974?
- 3) When did the term 'nanotechnology' acquire its current sense?
Which book is considered to be the first on the topic of nanotechnology?

Урок 7. Fundamental Concepts of Nanotechnology

Упр.1. Запомните следующие слова:

10^{-9} – ten to the minus nine power
DNA (Deoxyribonucleic acid) – ДНК
cellular – клеточный
double-helix – двойная винтовая спираль
mycoplasma – микоплазма
top-down – сверху вниз
bottom-up – снизу вверх
genus – род
bacteria – бактерия
outcome – результат
approach – подход
entities – объекты
to evolve – развиваться

Упр.2. Прочитайте и переведите текст:

Fundamental Concepts of Nanotechnology

One nanometer (nm) is one billionth, or 10^{-9} , of a meter. By comparison, typical carbon-carbon bond lengths, or the spacing between these atoms in a molecule, are in the range 0.12–0.15 nm, and a DNA double-helix has a diameter around 2 nm. On the other hand, the smallest cellular life-forms, the bacteria of the genus *Mycoplasma*, are around 200 nm in length. To put that scale in another context, the comparative size of a nanometer to a meter is the same as that of a marble to the

size of the earth. Or another way of putting it: a nanometer is the amount a man's beard grows in the time it takes him to raise the razor to his face. This analogy is clearly subjective to specific scenario and also situational differences that may change the outcome of the event. So the speed at which is stated is just an example of an "average" that can measure the speed. Two main approaches are used in nanotechnology. In the "bottom-up" approach, materials and devices are built from molecular components which assemble themselves chemically by principles of molecular recognition. In the "top-down" approach, nano-objects are constructed from larger entities without atomic-level control. Areas of physics such as nanoelectronics, nanomechanics and nanophotonics have evolved during the last few decades to provide a basic scientific foundation of nanotechnology.

Упр.3. Вставьте предлоги в следующие предложения:

- 1) One nanometer is one billionth ... a meter.
- 2) A DNA double-helix has a diameter ... 2 nm.
- 3) The bacteria ... the genus Mycoplasma is ... 200 nm ... length.
- 4) There are two main approaches used ... nanotechnology.
- 5) Materials and devices are built ... molecular components which assemble themselves chemically ... principles ... molecular recognition ... the "bottom-up" approach.
- 6) ... the "top-down" approach, nano-objects are constructed ... larger entities ... atomic-level control.

Упр.4. Переведите словосочетания:

One billionth of a meter; a DNA double-helix; the smallest cellular life-forms; the bacteria of the genus Mycoplasma; to build materials and devices from molecular components; to assemble themselves chemically by principles of molecular recognition; to be constructed from larger entities without atomic-level control.

Упр.5. Ответьте на вопросы:

- 1) What is the size of nanometer to a meter?
- 2) Which diameter has a DNA double helix?
- 3) What is the length of the bacteria of the genus Mycoplasma?
- 4) Which approaches are used in nanotechnology?
- 5) What is the difference between the approaches?

Урок 8. Nanomaterials

Упр.1. Запомните следующие слова:

reduction – сокращение
quantum effects – квантовые эффекты
ratio – отношение
catalytic – каталитический
ion – ион
opaque – непрозрачный
transparent – прозрачный
insoluble – нерастворимый
inert – инертный
catalyst – катализатор

Упр.2. Прочитайте и переведите текст:

Larger to Smaller: a Materials Perspective

A number of physical phenomena become pronounced as the size of the system decreases. These include statistical mechanical effects, as well as quantum mechanical effects, for example the “quantum size effect” where the electronic properties of solids are altered with great reductions in particle size. This effect does not come into play by going from macro to micro dimensions. However, quantum effects become dominant when the nanometer size range is reached, typically at distances of 100 nanometers or less, the so called quantum realm. Additionally, a number of physical (mechanical, electrical, optical, etc.) properties change when compared to macroscopic systems. One example is the increase in surface area to volume ratio altering mechanical, thermal and catalytic properties of materials. Diffusion and reactions at nanoscale, nanostructure materials and nanodevices with fast ion transport are generally referred to nanoionics. Mechanical properties of nanosystems are of interest in the nanomechanics research. The catalytic activity of nanomaterials also opens potential risks in their interaction with biomaterial. Materials reduced to the nanoscale can show different properties compared to what they exhibit on a macroscale, enabling unique applications. For instance, opaque substances become transparent (copper); stable materials turn combustible (aluminum); insoluble materials become soluble (gold). A material such as gold, which is chemically inert at normal scales, can serve as a potent chemical catalyst at nanoscales. Much of the fascination with nanotechnology stems from these quantum and surface phenomena that matter exhibits at the nanoscale.

Упр.3. Найдите в тексте английские соответствия следующим словосочетаниям:

Сокращение размера частиц; изменять электронные свойства твердых частиц; изменять физические свойства материалов; исследования в наномеханике; механические свойства наносистем; взаимодействие наноматериалов с биоматериалами; уменьшать материалы до наноуровня; превращать непрозрачные вещества в прозрачные; быть инертным; служить мощным химическим катализатором на наноуровне.

Упр.4. Закончите следующие предложения:

- 1) Quantum effects become dominant when the nanometer size range is reached, typically at distances of
- 2) Diffusion and reactions at nanoscale, nanostructures materials and nanodevices with fast ion transport are generally referred to
- 3) *Mechanical* properties of nanosystems are of interest in
- 4) Opaque substances reduced to the nanoscale become
- 5) Stable materials reduced to the nanoscale turn
- 6) Insoluble materials reduced to the nanoscale become
- 7) Gold, which is chemically inert at normal scales, can serve as

Упр.5. Ответьте на вопросы:

- 1) Why do statistical mechanical effects and quantum mechanical effects become pronounced?
- 2) When do quantum effects become dominant?
- 3) What does nanomechanics study?
- 4) Do materials reduced to the nanoscale exhibit the same properties as on a macroscale?
- 5) When can gold serve as a potent chemical catalyst?