XI Russian Internet Olympiad on Nanotechnology
"Breakthrough to the Future"

National Student Team Contest

Basic Guidance Rules

Introduction

Russian scientists have born ten years ago a new extraordinary tool for selection of talents and their career promotion - the Russian nanotechnology Olympiad "Breakthrough to the Future". Nowadays, this official top level multidisciplinary Olympiad represents joint educational, scientific and PR activity of two co-organizers, Moscow University and RUSNANO, involving a wide range of participants – from young schoolchildren to young PhD scientists and teachers. The basic idea of the Olympiad to fight against pseudoscience (in 2007) has successfully transformed through the years into sharing and social implementation of achievements of advanced chemical, physical, mathematical, biological sciences related to nanotechnology innovations. At the moment, the 30 000+ participants are united into the virtual Nanoclub which plays the role of a core audience of the www.nanometer.ru site representing both the Olympiad Internet event and also a famous web portal of popular sciences. Such a combination attracts people since they learn new verified facts, present and discuss their ideas, earn new career pathways and contacts.

A quit unique feature of the Olympiad is related to a large number of social groups involved into the network Olympiad project lasting for years; many former schoolchildren participants take part in the Olympiad each year and thus grow up to the student and PhD status still participating in the Olympiad competitions of their level and even generating new authors of the Olympiad problems and increasing the population of its volunteers in different regions of Russia.

A key idea of the Olympic events of recent years falls into a sequence of three main stages of getting new knowledge and achievements. The first stage starts from publication of new hard tasks specific for each of the group of participants. The stage lasts intentionally for a month or even longer to allow the participants searching and composing their original answers. The second stage of evaluation includes publication of official solutions and a distant discussion of participants' solutions. The meaning of this stage is not only a formal appeal but also a first contact of participants and the jury. The third stage is also important and it gives a change to the 30% of top participants to take part in the Olympiad in Moscow in person. The stage combines solving theoretical tasks and oral presentations of first research projects for schoolchildren, open panel discussions on educational ideas

for teachers and a “black box” approach for evaluation of students. Each “black box” means an “unknown” piece of a modern device or a material as a subject to study by TES, SEM, XRD, Raman scattering spectroscopy etc. The selection of methods of investigation, comprehensive data interpretation, conclusions on the origin and applications of the “black box” objects made by the students determine the student’s rating in the competition. This seems to be highly friendly to students, it opens up their creativity, discover deep theoretical knowledge and practical skills, also it verifies understanding of nanotechnology innovations found in modern devices and materials.

Finally, the Olympiad develops itself further and is ready to be implemented into international events and mutual collaboration between the countries provoking a beneficial exchange of ideas and students.

The Contest

The National Student Team Contest (NSTC) is a competition among bachelor and master students of higher school in Russia; that includes special tasks in English on nanotechnology and nanomaterials subjects to select the best **national team members** for participation in the International NanoOlympic contest on nanotechnology. The NSTC consists of two main steps - a distant stage on solving theoretical problems in the field of nanotechnology and then discovering "black box" secrets in Moscow using modern analytical equipment. The sum achievements of both the stages will play the role for the formation of a Russian Nation Team of Students in nanotechnology assumed to take part in the International NanoOlimpiad (INO). The NSTS is a part of the Russian Internet Olympiad on Nanotechnology (RION), by definition.

The web address of NSTC is http://enanos.nanometer.ru/contest/13

The Scope

NSTC includes but not limited for both theoretical problems and experimental "black box" studies in the fields of nanotechnology closely related to modern materials science, physics, optics, inorganic, organic, analytical, physical chemistry, biochemistry, biophysics, nanomedicine, engineering of high-tech devices and IT technology, material treatment, technical entertainment, marketing of nanotechnology products.

The Goal and Tasks

The mail Goal of NSTC consists in selection of the best students to demonstrate national team achievements on the international level.

The contest tasks include:

- dissimilation of advanced knowledge and state-of-art on modern nanotechnology, nanomaterials, material processing and practical analytical tools among future specialists in nanotechnology and other high technologies of the modern society,
- improving skills, knowledge and mind of nanotechnology specialists,
- cultivating the spirit or research and development among talented youth,
- selection and promotion of best students in the field of nanotechnology,
- creation of national and international cross links between research teams,
- development of new ideas and approaches in the field of nanotechnology and nanomaterials.

Organizers

Lomonosov Moscow State University and the Fund for Infrastructure and Educational Programs are the organizers of RION and NSTC as a part of RION. At the same time, the NTSC program and regulations are being coordinated in accordance with the known INO rules to provide better results of National Student Team participation in INO. Persons responsible for contacting with INO representatives are named among the RION Organizing Committee official members. The NSTC Jury has to be formed by the Organizers among leading scientists and researchers in the field of the contest. The Jury rates the solutions of the participants on the basis of full independence, transparency and scientific ethics. The final results are confirmed by the responsible representatives of the Organizers prior to a public announcement of the winners of the contest. The winners are supported within the budget limits of RION in terms of travel and living expenses in Moscow and travel expenses to INO with limited finding of their stay in the host country of INO.

Participation

All the participants must register using the official Internet platform of RION http://enanos.nanometer.ru. Registration is followed by solving theoretical tasks and preselection of the participants for the second tour of the "black box" contest in Moscow. Only BS and MS students, the citizens of Russian Federation, are legible to participate. All the participants must be polite, tolerant and well skilled through the entire competition process.

Time Schedule

The starting date of NSTC is the same as for RION and should be within the first decade of December. The ending point of the first, theoretical, part should be limited by the end of January. The second, experimental, tour and the final selection procedure of the National Student Team should be settled on the end of March being the closing point of RION. The post - olympiad support of the Team is postponed till the announcement of INO and the planning of the visit of the Team in the host country of INO.

Final Remarks

Web site of RION – http://enanos.nanometer.ru, the web site of the Fund for Infrastructure and Educational Programs – http://www.rusnano.com/infrastructure. Contacting address – enanos@nanometer.ru.