



# News

Number 14, J



**Dr. Aboutorabi:** With a strong belief and will power, Iranian people won the revolution and the imposed 8-year war and so guaranteed the security, independence and freedom for their country and fellow compatriots.

**Dr. Basu (The Manager of Fuel Cell and Battery of Calcutta's Glass-Ceramics Research Center):** The collaboration of both Research Centers for the technical development of solid oxide fuel cells is a great objective; the results of which can be beneficial for the people of both countries in future.



## Latest News

### Commendation of «Winner of Energy Efficiency Contest», «Expectation Era» and «Top Pupils» during Mid-Shaban Celebration Ceremony

The anniversary of the Mid-Shaban was celebrated on Tuesday August 7th in the Shaheed-Bayat-Movahed Auditorium. In this ceremony, Dr. Davood Rastegar Moghadam was commended on account of his superior proposal on **Energy Optimization Contest**, the winners of the **Expectation Era** contest were praised for their high records and the top employees' children were given Parsiyan credit-cards for their acquiring of high scores during their last-year school grades.

Continued on page 2.

### The Annual Ordinary Meeting (Second Round) of the Consumer's Cooperative Society of the MERC

The annual ordinary general meeting of the MERC consumers cooperative society was held on Saturday August, 4th in the Shaheed Bayat Movahed Auditorium. At first, the difficulties related to the opening of the cooperative shopping center were explained to the audience and then a 20-day deadline was granted to the former board of managers to transfer the remaining funds of the corporation to the newly-elected board of the managers.

### Meeting of the MERC Housing Cooperative Society

Meeting with members of the managerial board of the housing cooperative society was held in presence of the inspector of the cooperative society on July 19th at MERC. The executive director described the procedures taken to purchase land pieces from Sanjesh Organization for construction of 2-bedroom 72, 75 and 95 m<sup>2</sup> apartments in the southern Naz town. She told the audience that the permission and plans for construction of 25 blocks of five-storey buildings in the lands had been issued.

### Book Reading Contest

On the auspicious anniversary of the birthday of the savior of the mankind, Imam of the Era, the cultural affairs department held a contest named «Expectation Era» supervised by the prayer leader of the MERC. The winners were offered cash prizes in the Mid-Shaban ceremony.

### One-Week Vacation

By approaching the holy month of «the feast of God», based on the employee's request for taking journey during summer, in order to provide an opportunity for upgrading of the MERC's telecommunication system, the board of directors passed a resolution and officially declared a one-week holiday from 15-22 of August. Certain offices such as public relations and installation-repair departments kept working hard during this week.

### Interviewing PhD Candidates (from among top graduate students)

The regulations of the Ministry of Science, Research and Technology of the Islamic Republic of Iran, stipulate that the

### The International Exhibition of U... Cent...

The Unex International Exhibition with the "bright horizons for the techno-collaborations of Iran and Tajikistan" was held in the city of Dushanbe at Unity Palace, 6-9 July. On July, 6th: The Deputy of Tajikistan's Science made a speech in the inauguration ceremony where Dr. Khoramshad (the



from both countries were present. After the officials paid a visit to the pavilions and the exhibition. During a visit to the MERC stall, Dr. Khoramshad briefly elaborated on its achievements and its activities. Dr. Khoramshad said that the MERC is one of the most active Research Centers

On July 7-8, 2009: Because of the inaccessibility of Dr. Vaezi, Dr. Amini and Mr. Niko... the MERC stall at the Unex Exhibition had turned into an attractive place for the display of scientific, educational and research achievements of the MERC. Since some of the inventors' instruments could not be transported to Tajikistan, therefore, it was not possible to display them to the visitors, nonetheless, explanations about these instruments were given to the visitors. Most visitors were impressed by the products displayed at the stall, and they demanded a closer tie with the MERC especially in the fields of renewable energies and application of nanopowder in different industries. Professor Safar... physics lecturer at Tajikistan Technical University, while expressing his willingness for closer collaboration with the experts





## Mid-Shaban Celebration

Continued from page 1:

**Dr. Sadrnezhaad:** After congratulating the Sabanieh days and important birthday anniversaries especially of the promised Mahdi to the audience and Muslims throughout the world, he talked about



Islamic vision and the responsibility of scientific and research centers to expand knowledge and human values as related to the Shabanieh days. He then elaborated on how the winners of «Energy Optimization», «Expectation Era» and top pupils were selected and on the opening of the consumers cooperative store. He added: "God willing, this shopping center will be at the service of our colleagues". He also mentioned MERC progresses in launching of new laboratories and the purchase of advanced equipments and added: "with the assistance of Allah and the hard work of the staff, MERC has greatly increased the quality and quantity of its services and it has achieved remarkable achievements in the domain of cultural, scientific, research and educational affairs. Referring to the staff children present in the ceremony, he called them the "future builders" of the country and wished them prosperity and success. Then the public relation office played a short film about the MERC activities.

**Dr. Seyed Mohammad Abutorabi** the guest speaker of MERC, while expressing his pleasure for being at the MERC, said: "I use this opportunity and try to briefly touch upon the main objectives of revolution of the human savior as the promised Mahdi. One of the outcomes of Imam's uprising will be security. Security is a precious and dear commodity which everybody looks for, so that they can fulfill their potentials. Another divine

earth. He then referring to Islamic Revolution of Iran continued: "we have experienced some of the promises in our revolution. The downtrodden nation of Iran revolted against discrimination, poverty and injustice. This revolution and its achievements is a precious gift for posterity. In the past, foreigners used to control everything in Iran. In fact, our nations had turned into slaves for the foreign powers. Today, we take pride on being independent and our defense against the imposed war brought us security, independence and freedom. We should be grateful to all those who shared with us in this wonderful achievement". In last part of the ceremony, the officials presented MERC prizes to the winners.

### A. Top students

**Pre-university:** Mahdi Hajali, Reza Mirzaee.

**Third Year High School:** Maryam Shami Harris.

**Second Year High School:** Seyede Parastou Shahmiri, Mohammad Reza Pazouki

**First Year High School:** Amir Nasiri, Seyed Nima Mirkhani, Elham Adineh, Anita Pormohammad Taghi, Seyed Mohammad Masoud Sadrnezhaad.

**Third Year Guidance School:** Gelare Ghafariasl, Seyed Mohammad Saeed Alavi, Farnaz Noraei, Ali Tadayon, Samane Amiri, Maryam Yazdanirad, Elnaz Dehgan.

**Second Year Guidance School:** Parisa Parsa.

**First Year Guidance School:** Sayna Yasoubi, Fatemeh Nemati Tasande, Homan Kazem Zadeh, Amir Zannouri, Reza Zareyee, Seyed Sina Mirkhani

**Fifth Year Primary School:** Amir Hussein Shah Koupa, Ghazale Hasanpor, Peyman Mahmoudniya, Sahar Abbasi, Seyed Mahdi Ashur Jopish, Leyla Nourouzi, Sharife Amini, Nazanin Rezaee, Mohammad Reza Shahraki, Narges Zarghami, Somaye Amir.

**Fourth Year Primary School:** Ali Maghsoudipor, Marziyeh Maleki, Behnam Rabiani, Pouya Lotfollahbeygi, Melika Rajabi Asghari, Kimiya Aghaee, Mohammad Reza Nikbin.

**Third Year Primary School:** Behnam Rastegar Moghadam Mobaraki, Seyed Sina Alavi, Simin Reysi Dehkordi, Zahra Nasiri, Arvin Abasporsani, Sara Tadayon, Saghar Tadayon, Mohammad Ali Shahraki, Zahra Hassan Tamouri, Mahfam Nouranyan, Parinaz Shahmiri.

**Second Year Primary School:** Porya Anteh, Reyhane Amini, Zahra Yazdi, Asal Karimi, Ali Jabari, Maral Chavoushi Tehrani, Mohammad Reza Rezaee, Niki Mirza Mohammadi Kosariz.

**First Year Primary School:** Hannane Dinmohammadpour, Rana Alikhani Hesari, Ali Rezaee, Katayoun Shahkoupa.

### B. The Winners of the Expectation Era Contest

This contest which was supported by the "Prayer Tribute and Cultural Affairs Office" under the supervision of Haj Agha Hassan Timouri (the prayer leader at the mosque of MERC) had the following winners:

Misters Mohammad Anteh, Alireza Baneshi, Valiollah Tarverdi, Nabiollah Tarverdi and Mistresses Zari Behniafar, Maryam Zameni, Zhila Ziayerad, Zahra Talebzadeh, Masome Enayati, Maryam Fouladiyan, Seyede Maryam Ghaderi, Mona Ghotbizadeh, Marjan Khashanaki.

### The Winners of the Energy Consumption Optimization Proposal Contest

At the end of the ceremony, the director of the MERC expressed his gratitude to Dr. Rastegar Moghadam for his efforts in nutrition department, health and sanitation office and contest performances and offered him with a present for his selected proposals for energy consumption rationalization.

June 22

- \* Internal Pro
- Affecting M**
- by Dr. Sadr
- Aspergillus**
- \* The request
- articles at "T

June 20

- \* **MSc Semina**
- sors on the**
- Mohammad F
- duction and**
- seminar of M
- ability Spee**
- vised by Ms.
- Two-stage S**
- ics" under s**
- Taheri entitle
- bine Blades'**
- entitled: "Pro
- vised by Dr. A
- "Feasibility**
- Spraying Me**
- Zameni entitl
- Zirconium Ti**
- nar of Mr. Yo
- tems for App**
- supervised b
- entitled: "Co
- activated So**
- \* **MSc Propos**
- Magnetite M**
- san Marzban
- \* **Comprehens**
- his compreh
- rection of S**
- Dr. Amir Ali Y

July 20

- MSc Seminars**
- The Lifting Po**
- Rezaeeraad's S
- to assess the
- Zamzaman, M
- ramics-polyme**
- Maryam Najafi
- conductor nar**
- Ali Musavizade
- Phase Of Tio**
- Vaheed Payan
- supervised by
- Scheduling se**
- cation Departm
- ses in writing.

**Some of the**

**Note:** Students

member as th

college in wh

subject of the

compatible, ud







Materials and Energy

## Newsletter

## Articles

### Presentation of student's seminars and projects

1. On June, 20<sup>th</sup>, Minoo Zamanifard presented her seminar entitled: "The application of One-Dimensional Nanostructures in Chemical Sensors".



Nowadays the production of micro-sized and highly stable materials for chemical sensors used in high temperatures has turned into one of the technological challenges for researchers. For making the nanostructures stable,

different methods such as adding an outside element or another phase are used. Another method currently used is the production of one-dimensional nanostructures for the oxide of a given material. In this seminar, the advantages of one-dimensional nanostructures for the application in gas sensors were described.

2. On June, 21<sup>st</sup>, Shirin Jabali Moeen presented her seminar entitled: "Ferrites Synthesis, their Properties and Applications". From the technology point of view, magnetic nanoparticles of spinel ferrites (Me Mg, Fe, Mn, Co, Ni, Zn, Cu, Cd, ...)  $MFe_2O_4$  belong to an important part of engineering materials especially electroceramics which in recent years have become very significant due to their unusual physicochemical properties and their potential application in data storing systems, magneto caloric cooling devices, increase of contrast in magnetic resonance screens, magnetic fluids, absorbents of microwave radiations, diagnostic medical tools, drug delivery guideline, kernels of high frequency convertors, bar antenna, radio frequency coils, sensors and most recently as radar absorbents for the camouflage and coverage of military equipment. This seminar aimed to introduce the new ferrite synthesis methods for the production of products of special properties.

3. On June, 22<sup>nd</sup>, Mohammad Mahdi Rafighdoust defended his master thesis entitled: "The production of molite - zirconium composites through gel casting and the study of their mechanical properties". In this project,



molite - zirconium composites were produced through reactive sinter between alumina and zirconium by gel casting method. To do so, grout / slurry of alumina and zirconium was used. At first, the optimal stability conditions of the slurry was

examined and then after casting, the final conditions such as their flexural strength, hardness and toughness of the produced

reaction to certain gases decreases after a while. A new solution for this problem concerns the use of metal oxide composites like  $TiO_2$  and  $SnO_2$  which are known as a blend of catalyst and sensor properties. At this seminar, the features of semi-conductor couple materials were described.

6. On July, 18<sup>th</sup>, Yadollah Ganjkanlow defended his master theses entitled: "synthesis and study of nanostructures of luminance yttrium compounds doped with europium and erbium". In this project, the  $Y_2O_3:Eu$ ,  $Y_2O_3:Er$  and  $Y_2O_3:Eu,Sr$  compounds were synthesized by means of combustion, normal cell-gel, and micro-emulsion synthetic methods. Then optical, structural and microscopic analyses were performed on the synthesized samples and the compounds were optimized. The synthesized compounds had luminance property and they can be used in screens, monitors, fluoresce lamps and fluoresce paints.



7. On July, 25<sup>th</sup>, Hussein Zareyee, defended his master thesis entitled: "The Impact Of Effective Parameters In The Hydroxide Nickel Nanoparticles Deposition Process". In this project by producing hydroxide nickel powder by means of chemical deposition method especially complex-decantation method, the impact of different processing factors on the decrease of particles size and the shape of hydroxide nickel particles and also chemical composition were investigated. The results show that the complex-decantation method is a cost-effective and easy way for the production of nanosized and symmetrically homogenous hydroxide nickel powders. Moreover, by changing the parameter of complex analysis method, while preserving the uniformity, it is possible to produce spherical, chip and laminate particles. And then nickel oxide powder was produced by means of dehydroxidation reaction.



8. On July 27<sup>th</sup>, Behzad Amini Kia gave a lecture on "The Comparison Of Mechanical Alloying And Self Diffusion Combustion Synthesis For The Synthesis Of Non-Oxide Ceramics". Considering the widespread use of mechanical alloying and self-diffusion combustion synthesis methods in the



R  
1. Initiative pla  
double-glazed w  
cover a vast area  
and temperature  
much, making  
windows would gr  
new plan propose  
MERC, instead  
windows with do  
decided to add  
distance to the pr  
of PVC bands.



### Methodology:

1. Preparing the wi
2. Covering the ed  
bands, (to preve  
air penetration b
3. Cleaning the i  
would not be p  
future)
4. Fixing the screw
5. Making use of a

### Some education

Continued from page  
**Students' pr**  
outside the m  
Those proj  
(belonging to str  
from other res  
centers) which are  
in the MERC, sho  
sent to the Res  
Council to be disc  
and approved ther  
Research Office wi  
charge of adminis  
works.

**Trainee Application**  
The request of o  
students to wor  
trainees at the MER  
be accepted only  
of the faculty me  
assumes responsi  
Attending ser  
presentation an  
defense sessions







Materials and Energy  
Research Center

# Newsletter

Number 14, July & August 2009

## The installation of new equipment at MERC

**Atomic Absorption Spectrometer:** It is used for the analysis of elements present in solutions. Elements such as zinc, iron, nickel, molybdenum, vanadium, etc., can be measured with a precision of few milligram in liter (ppm) by this instrument.

The atomic absorption spectrometer works on the basis of the amounts of energy absorbed during changes in the structure or motion of the molecules by the atoms of the flame. At first, the sample is diluted to the degree necessary for a given element and then for atomization, it is injected into the flame. To produce radiation for a given element, special lamp for that element is used. In emission spectroscopy, atoms are excited to energy levels higher than their lowest normal levels (ground states) by means of electrical discharges (arcs, sparks) or flames. Identification of the elemental composition of an unknown substance is based on the fact that when the excited atoms return to lower energy states, they emit light of characteristic frequencies.



**Oven 707:** It is used for the drying of laboratory glassware and tested ores. It can hold a capacity of 707 liter and its temperature can be heated up to  $250^{\circ}\text{C}$ . This oven has several layers where the needed items are placed on them and dried by passing hot air through them. This oven is automatic and can be programmed and connected to computer. It can also be linked outdoor by a chimney.



**Orbital Shaker:** Shaking horizontally and vertically, this instrument is used for the shaking of materials. This is used for chemical reactions which require long synthesizing times. For instance, this device is used for solvent extraction and leaching processes. It is also suitable for doing equilibrium reactions.

**Centrifuge:** Rotating with a high speed, this device can be used for the concentration and purification of

in leaching synthesis processes.

**Spectrophotometer (UV/VIS):** it is used for measurement of concentration of elements present in solutions such as copper, vanadium, etc....it works on the basis of the radiant energy transmitted or reflected by a body as a function of the wavelength. Ordinarily the intensity of the energy transmitted is compared to that transmitted by some other system that serves as a standard. According to Bouguer (Lambert's) law, each layer of equal thickness of a medium absorbs an equal fraction of the energy traversing it. According to Beer's law, the absorbance capacity of a dissolved substance is directly proportional to its concentration in a solution. For analysis of elements, at first the solutions are diluted and then a given reagent is added to it. The addition of the reagents produces color complexes in the solution with an intensity which is proportional to the concentration of element in the solution. This instrument has an incandescent or fluorescent lamp which radiate on the sample and by measuring the intensity of the reflected radiation from the sample, the concentration of the desired element can be determined.



**Rotary (vacuum distillation):** This instrument consists of three parts namely steam ejector, vacuum pump and the package. It is mainly used for the separation of liquid phases by means of distillation. By changing the temperature and viscosity, the boiling points of liquids can be changed and this advantage is used to separate fractions. This instrument has a condenser tower through which cold water passes through a spiral pipe and thus liquefies the vapors around it.



**Ultraviolet spectrometer (FTIR):** ultraviolet spectrometry is a useful and common method for identification of materials. The frequency of



