

**Scientific & Technological Achievements of I.R. of Iran  
(Sept. - Oct. 2015)**

**This issue contains:**

- Development of nanotechnology to fight gastric cancer
- Special sensor measures anti-diabetes drug
- Researchers develop nanopaper-based optical sensing platforms
- Iran tops West Asia in scientific progress
- New Nanocomposite Designed in Iran for Production of Supercapacitors
- Iranian nano-drug cures cutaneous leishmaniasis
- Invention helps disabled people communicate with eye movements
- Iranian researcher develops dry goods Nano-packages
- Cellulose nanopaper produced for disease agents detection
- Tabriz Univ. researchers develop high-temp ceramic
- Scientists use graphene quantum dots to produce azo dyes
- Cheap nanomembrane produced for high-temp. fuel cells
- Polymeric nanocomposites to substitute steel tanks
- Anti-migraine drug produced
- Iranians produce nanocoatings to improve body implants
- Disinfectant produced for nanotechnology surfaces
- Five Iranian scientists enlisted in ISI citation database
- Varsity produces hybrid car with hydrogen fuel-electric battery
- Iran produces domestic gas flow divider
- Researchers synthesize nanoparticles using pomegranate peel
- Iran breaks monopoly of sonar system production
- University research hits breast cancer smart therapy
- ZnSn nanoparticles synthesized for optical purposes
- Making new generation of bulletproof vests
- Iran finds new model for nanocomposites' behavior

### **Development of nanotechnology to fight gastric cancer**

Kerman Graduate University of Advanced Technology conducted a study on the production of biopolymer nanoparticles loaded with Carvacrol to fight against gastric cancer cells. The study shows that the biopolymer nanoparticles are capable of trapping carvacrol to significantly increase anti-cancer effects.<sup>1</sup>

### **Special sensor measures anti-diabetes drug**

Iranian researchers used a simple and cost effective method to design a laboratorial sample of sensor with high selectivity and sensitivity in measuring anti-diabetes drugs. The produced sensor shows highly successful performance in the measurement of anti-diabetes drug in drug and real samples. Results of the research have been published in *Sensors and Actuators B: Chemical*, vol. 221, 2015, pp. 807-815.<sup>2</sup>

### **Researchers develop nanopaper-based optical sensing platforms**

Researchers at Shahid Chamran University in an international collaboration with the Gorgan University of Agricultural Sciences and Natural Resources and the Academy of Sciences of the Czech Republic, managed to develop new sensing platforms based on bacterial cellulose nanopaper. This class of platforms will prove valuable for displaying analytical information in diverse fields such as diagnostics, environmental monitoring and food safety.<sup>3</sup>

### **Iran tops West Asia in scientific progress**

Iran stands first in West Asia in terms of population, scientific progress as well as oil and gas capacities. In the past 1.5 years, the country has ascended three steps and is now standing among the 15 pioneering science production nations in the world. Now 1,500 knowledge-based companies are active in different Iranian provinces.<sup>4</sup>

### **New Nanocomposite Designed in Iran for Production of Supercapacitors**

Iranian researchers produced a nanocomposite that can increase the capacity of electrochemical capacitors as an electrode. The nanocomposite has been produced at

---

1. <http://www.irandailyonline.ir/News/126406.html>

2. <http://news.nano.ir/50753/2>

3. <http://en.mehrnews.com/news/109949>

4. <http://english.farsnews.com/newstext.aspx?nn=13940618001203>

laboratorial scale through a green chemistry method by using relatively cheap raw materials. Results of the research have been published in Applied Surface Science, vol. 353, 2015, pp. 594-599. <sup>5</sup>

### **Iranian nano-drug cures cutaneous leishmaniasis**

Iranian scientists in a knowledge-based firm has been successful clinically in trial of a drug for the treatment of cutaneous leishmaniasis, and more than 95% of patients have been cured in three weeks. Good global market for this drug expected and in first phase apart from Syria, Iraq, Brazil, South Africa could also be candidates for exporting this drug. <sup>6</sup>

### **Invention helps disabled people communicate with eye movements**

Iranian researchers in a knowledge-based company managed to create a system through which patients with physical disabilities can type letters or communicate with others merely by their eye movements. This system is a human-computer interface in the form of a headset which is mounted on a pair of glasses to recognize the eyes' electrical signal to help disabilities convey their intention or request without need for hands. <sup>7</sup>

### **Iranian researcher develops dry goods Nano-packages**

An Iranian researcher has managed to build nano-coatings that are completely biodegradable and can be used for packaging walnuts. The developed coating will preserve the nutritional value of walnuts acting like a preservative agent for preventing the growth of mold and yeast during the storage time. It has been proved that by using this nano-coating the quality of walnut will not decrease. <sup>8</sup>

### **Cellulose nanopaper produced for disease agents detection**

Iranian and Spanish researchers produced laboratorial sample of sensors made of nanopaper to introduce bacterial cellulose nanopaper as a biological substrate for the production of optical transparent nanosensors to be used in medical and clinical diagnosis systems. Primary results of the research have been published in Biosensors & Bioelectronics,

---

5. <http://news.nano.ir/50754/2>

6. <http://kayhan.ir/en/news/18334> , <http://english.farsnews.com/newstext.aspx?nn=13920713001219>

7. <http://www.irandailyonline.ir/News/126910.html>

8. <http://en.mehrnews.com/news/110078>

vol. 74, 2015, pp. 353-359, and the final results have been published in ACS Nano, vol. 9, issue 7, 2015, pp. 7296-7305.<sup>9</sup>

### **Tabriz Univ. researchers develop high-temp ceramic**

Researchers at University of Tabriz have developed a high-temperature ceramics with wide applications in thermal protection systems of aerospace, ultrasonic planes, propellant parts and other industries such as plasma-arc furnace electrode and other components, welding and casting industries.<sup>10</sup>

### **Scientists use graphene quantum dots to produce azo dyes**

Iranian researchers succeeded in the laboratorial production of quantum dots made of graphene as catalysts to produce azo dyes to be used in color and textile industries. The produced nanocatalyst showed appropriate performance in increasing the efficiency of the production of azo dye compounds on the basis of green chemistry. Results of the research have been published in Dyes and Pigments, vol. 113, 2015, pp. 522-528.<sup>11</sup>

### **Cheap nanomembrane produced for high-temp. fuel cells**

Iranian researchers produced nanomembranes that can be used in the production of high temperature fuel cells, INIC reports. The membrane has been made of a cheap nanocomposite through a simple method and economic justification. This research can help the development of fuel cells as an option for reducing pollution. Results of the research have been published in Journal of Power Sources, vol. 276, 2015, pp. 62-72.<sup>12</sup>

### **Polymeric nanocomposites to substitute steel tanks**

Iranian researchers produced polymeric nanocomposite with high thermal, chemical and mechanical resistance which can be used as substitute and a good replacement for the existing steel tanks and they lead to economic saving due to their lower weight. Results of the research have been published in Journal of Applied Polymer Science, vol. 132, issue 33, 2015, pp. 42939-1 to 42939-8.<sup>13</sup>

---

9. <http://english.farsnews.com/newstext.aspx?nn=13940628000124>

10. <http://newspaper.iran-daily.com/newspaper/pagepdf/5999>

11. <http://news.nano.ir/50862/2>

12. <http://www.iraniansdaily.ir/View.aspx?nid=5676>

13. <http://en.mehrnews.com/news/110489>

### **Anti-migraine drug produced**

Abidi Pharmaceutical Company of Iran has managed to domestically produce Depakine which is used in treating migraine and epilepsy. Depakine is one of the most effective drugs for treatment migraine and holds a special place for treating patients suffering from this ailment. With production of the drug, the country would become self-sufficient and would have no need to import it.<sup>14</sup>

### **Iranians produce nanocoatings to improve body implants**

Iranian researchers obtained positive results in studying a type of composite nanocoating to obtain modified properties of biomaterials to be used in human body. The nanocoating has high resistance to abrasion and corrosion. Results of the research have been published in *Ceramics International*, vol. 41, issue 9, 2015, pp. 12355-12363.<sup>15</sup>

### **Disinfectant produced for nanotechnology surfaces**

Nano Pars Khazar, Iranian knowledge-based company has produced a disinfectant for nanotechnology surfaces. The company has presented silver nanoparticles as a solution to disinfect surfaces. The product can be used in different places including hospitals, factories of food, farms and slaughterhouses.<sup>16</sup>

### **Five Iranian scientists enlisted in ISI citation database**

According to Islamic World Science Citation Center (ISC) report five top Iranian scientists have been enlisted in the Information Sciences Institute (ISI) citation database. The criterion was the level of scientific influence of these scientists in the world of science and the influence has been calculated based on the number of citations from their papers.<sup>17</sup>

### **Varsity produces hybrid car with hydrogen fuel-electric battery**

Researchers at Khajeh Nasireddin Industrial University have produced a hybrid car fuelled by hydrogen and electrical battery. It has a 10-liter trunk for hydrogen enough to drive 400 kilometers. It has a system that is capable of providing the entire, or part of the required

---

14. <http://www.irandailyonline.ir/News/127824.html>

15. <http://english.farsnews.com/newstext.aspx?nn=13940705000136>

16. <http://en.mehrnews.com/news/110588>

17. <http://www.isna.ir/en/news/94071207591>

energy for the electrical engine if the driver presses the button to do so. The engine power of the Iranian hybrid car is 50 kilowatts and its environmental pollution is next to nothing.<sup>18</sup>

### **Iran produces domestic gas flow divider**

An Iranian knowledge-based company has managed to make new gas flow divider compatible with Iran's climate, which is a vital piece in petroleum refining industry. The Iranian flow divider has been produced based on global standards and despite its higher quality it costs half as much as the European or American models.<sup>19</sup>

### **Researchers synthesize nanoparticles using pomegranate peel**

Researchers at Amirkabir University of Technology have found an eco-friendly method to synthesize silver nanoparticles using two natural materials, Mignonette and pomegranate peels. The resulting nanoparticles enjoy antibacterial properties and can be used in medical fields as well as antimicrobial textiles. This green method is a good alternative to conventional chemical approaches due to lower production of toxic and dangerous materials which are harmful to human.<sup>20</sup>

### **Iran breaks monopoly of sonar system production**

An Iranian knowledge-based firm has managed to design and build a sonar system that can find underwater obstacles and process the data simultaneously. The new system can be used in a variety of sonar systems in submarines and works as minesweeper, depth gauge, obstacle detector, etc. So far the only manufacturers of the device in the world have been France, America and Britain. The Iranian system does not have the restrictions of foreign models and it can be used for a variety of offshore and underwater explorations.<sup>21</sup>

### **University research hits breast cancer smart therapy**

Researchers in Zanjan Islamic Azad University and University of Guilan have developed gold nanorods with potential uses in treating breast cancer through smart thermotherapy. The

---

18. <http://www.irna.ir/en/News/81786666>

19. <http://en.mehrnews.com/news/110683>

20. <http://www.iraniandaily.ir/View.aspx?nid=6266>

21. <http://newspaper.iran-daily.com/Newspaper/Page/5184/8>

drug would be applied in human tumor after laboratory and quality check processes. Low costs and side-effects are potential advantages of the thermotherapy.<sup>22</sup>

### **ZnSn nanoparticles synthesized for optical purposes**

Mehdi Molaie, a faculty member at Vali-E-Asr University of Rafsanjan has synthesized ZnSn (Zinc Selenide) nanoparticles for optical and biological purposes. Zn compounds have light emitting properties, and are widely used in light-emitting diodes (LEDs) or in wide range of medical areas, such as malignant tumors diagnosis or drug delivery.<sup>23</sup>

### **Making new generation of bulletproof vests**

Malek-Ashtar University of Technology researchers designed and manufactured new generation of liquid armors using nanotechnology to make light and flexible bullet-proof vests. This new armor can be used for personal protection against mines, bombs, bullets, knives, armored vehicles and fighter aircraft protection, blankets to absorb the blast wave, anti-mine boots for soldiers, gloves resistant to cutting to protect doctors and nurses.<sup>24</sup>

### **Iran finds new model for nanocomposites' behavior**

Iranian researchers from Amirkabir University of Technology presented a numerical model to predict the behavior of polymeric composites more precisely in the presence of nanoparticles. Outcomes of the research have applications in materials engineering, mechanical engineering and aerospace to decrease laboratorial costs. Results of the research have been published in Composites Science and Technology, vol. 117, issue 1, 2015, pp. 379-385.<sup>25</sup>

---

22. <http://el-akhbar.com/en/University-research-hits-10858> , <http://en.mehrnews.com/news/110878>

23. <http://en.mehrnews.com/news/110855>

24. <http://en.ghatreh.com/view/76079/Iran-makes-new-generation-of-bulletproof-vests>

25. <http://english.farsnews.com/newstext.aspx?nn=13940723000162>