

University profile

Ali Bumajdad*

Nanoscience and nanotechnology research highlights at Kuwait University

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Kuwait University Nanotechnology Research Facility

Kuwait University, KU, is the only governmental university in Kuwait. It was established in October 1966. At that time, there were only three colleges: the College of Science and Arts, the College of Education and the College of Women. Now there are 16 colleges, with more than 36,000 students and around 1800 faculty staff members.

Mission

The KU mission is ‘to keep, develop, and disseminate human knowledge, in addition to develop national human resources in order to create leaders who are aware of national heritage and future needs in collaboration with other academic institutions of similar mission, and to strengthen national, Arabic, and Islamic values and principles of disseminating knowledge. Developing and investing in human resources, achieving excellence and distinction in education, scientific research, and community services is also important in utilizing modern technology [1]’.

Nanoscience and nanotechnology

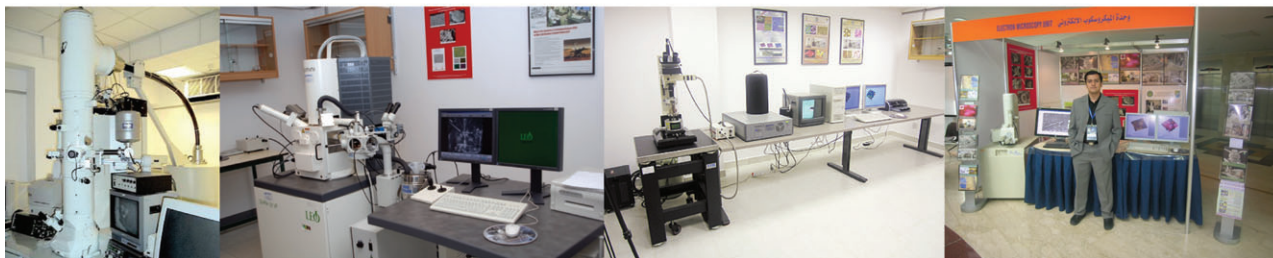
KU, is one of the leading Gulf Cooperation Council (GCC) Universities that has excellent infrastructure and capability. Recently, KU has focused on nanoscience and nanotechnology. Now, there are several researchers in such fields in the College of Science and the College of Engineering. The College of Science has the Nanoscopy Science

Center (NSC) (<http://www.nsc.kuniv.edu/>) and the College of Engineering has the Kuwait University Nanotechnology Research Facilities (<http://kunrf.eng.kuniv.edu/>). Also, KU recently signed a long-term collaboration agreement for research with the world-leading nanotechnology center, Interuniversity MicroElectronics Center (IMEC) (Belgium). The collaboration will focus on innovative silicon solar cell technologies.

Nanoscopy Science Center

The Nanoscopy Science Center (NSC) (previously the Electron Microscopy Unit) at the Faculty of Science is one of the oldest and most experienced microscopy centers in the region. The center was established in 1976; however, it was destroyed by the Iraqi invasion on the 2nd of August 1990. The center was completely renovated after the liberation. Now, there are three scanning electron microscope (SEM) devices (two of them can be operated remotely), one transmission electron microscope (TEM), and one high resolution transmission electron microscope (HR-TEM). There are also an atomic force microscope (AFM) and laser confocal microscopes operational at the Center. The Center is also fully equipped with biological and materials preparation laboratories. The Center was digitalized recently and now, all the sample data handling is in the form of digital images. Software for the analysis/interpretation of the nano-materials results is also available. The Center runs many workshops and training courses related to nanotechnology for both local and international researchers. Examples of previous workshops are: Electron Microscopy of Catalysis: A Two-Session Workshop On Application Outlines, Modes & Techniques (10 December, 2006), Application of High Resolution Electron Microscopy in Studying Catalysis (21–24 April, 2007), Electron Microscopy and Nanotechnology (6–10 April, 2008), Future of Nanoscience and Nanotechnology in the Region (7 May, 2008), etc.

Within 5 years, the NSC will be transferred to the new campus. The Center will be much bigger and more versatile



than the current one. The design is finished under my supervision and I am very much looking forward to see what we put on paper to come into reality.

Research at KU nano-facilities

With regards to the Nanoscience and nanotechnology research productivity of KU, Ali Bumajdad's group published most of the nanoresearch work in Kuwait (17 research articles out of a total of 70 published by researchers at KU). The work is related to novel synthesis of nanomaterial with potential application to green chemistry and renewable energy (see e.g., [2–8]). There are also young promising Kuwaiti researchers in the College of Engineering & Petroleum like Dr. Abdulwahab Salem Almusallam (Director of Nanotechnology Research Facility Labs) who is working on polymeric nanomaterials and their properties [9] and Dr. Yaser Mohammed Abdullaheem (Coordinator of Nanotechnology Research Facility Labs) who is conducting research related to solar cells and photovoltaic and who is taking a major role in the ongoing collaboration with the Belgium Nanotechnology Center 'IMEC'.

Other Kuwaiti researchers are also conducting research related to nanomaterials like Dr. Saad Makhseed, who is working on the synthesis of highly porous polymeric materials that can be used as hydrogen storage [10], and Prof. Fakhria Al-Sagheer, who is conducting research in collaboration with Prof. Zahoor Ahmad which is mainly concerned with nanocomposite films and their mechanical properties [8, 11, 12]. Prof. Ali Rakhshani is a material physicist, who is working on pure and doped ZnO nanofilms for photo optics applications [13, 14]. This is a short summary of most of the facilities/research related to nanotechnology at KU, and is not meant to review or cover all the published work of KU in the field of nanoscience and nanotechnology.

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References

- [1] Kuwait University. Website Available at: <http://ku.edu.kw>.
- [2] Bumajdad A, Zaki MI, Eastoe J, Pasupulety L. *J. Colloid Interface Sci.* 2006, 302, 501–508.
- [3] Bumajdad A, Eastoe J, Mathew A. *Adv. Colloid Interface Sci.* 2009, 147–148, 56–66.
- [4] Bukallah SB, Bumajdad A, Khalil KMS, Zaki MI. *Appl. Surf. Sci.* 2010, 256, 6179–6185.
- [5] Bumajdad A, Ali S, Mathew A. *J. Colloid Interface Sci.* 2011, 355, 282–292.
- [6] Banerjee S, Devi PS, Bumajdad A. *Nanotechnol.* 2011, 22, 275506.

- [7] Nag P, Banerjee S, Lee Y, Bumajdad A, Lee Y, Devi PS. *J. Inorg. Chem.* 2011, 51, 844–850.
- [8] Al-Omani S, Bumajdad A, Al Sagheer FA, Zaki MI. *Mater. Res. Bull.* 2012, 47, 2208–3316.
- [9] Almusallam AS. *Phys. Chem. Chem. Phys.* 2010, 12, 12198–12207.
- [10] Makhseed S, Samuel J, Bumajdad A, Hasan M. *J. Appl. Polym. Sci.* 2008, 109, 2591–2597.
- [11] Al-Sagheer F, Merchant S. *Carbohydr. Polym.* 2011, 85, 356–362.
- [12] Al-Sagheer F, Ali AAM, Muslim S, Ahmad Z. *Sci. Techno. Adv. Mater.* 2006, 7, 111–118.
- [13] Rakhshani AE, Bumajdad A, Kokaj J. *Appl. Phys. A* 2007, 89, 923–928.
- [14] Rakhshani AE, Bumajdad A, Kokaj J, Thomas S. *Appl. Phys. A* 2009, 97, 759–764.

