

# Abubaker Hassan Hamad

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Full Name: Abubaker Hassan Hamad  
Work Address: Soran University – Erbil – Iraq – Kurdistan  
Scientific title: Assistant Professor  
General Specialist: Laser-Materials Interaction  
Accurate Specialist: Nanotechnology-Laser Nanotechnology

## **EDUCATION**

1995 -1999 Undergraduate Student - Salahaddin University – Department of Physics  
Bachelor degree in General Physics

2002 – 2006 Demonstrator – Salahaddin University – Department of Physics

2007 – 2008 Postgraduate Student – Salahaddin University – Department of Physics  
MSc in Laser-bone interaction

**Thesis Title: Compact Bone Ablation by CO<sub>2</sub> Laser**

Supervisor: Professor Yousif M. Hassan

### **Brief Synopsis:**

The temperature profile in bone was measured experimentally as a function of time and depths. We used modulated CO<sub>2</sub> laser for in vitro ablation of calf compact bone. Both dry and wet ablation (or incision) processes were done for calf compact bone. In the case of dry ablation, bone sample was histologically examined, three thick thermal damage layers were microscopically observed. The depth of 3.35 mm was obtained during wet ablation (~ 17–19 ml(H<sub>2</sub>O)/min) using the ablation parameters  $\nu_L=1280$  Hz,  $E_L=19.8$  mJ,  $\tau_L=230$   $\mu$ s and  $n=0.97$ , the damage layer of 70-75  $\mu$ m was observed along the bone incision. The dry and wet ablation were compared using different energy density ( $\phi$ ) and equivalent pulse number ( $N_{eq}$ ). It was found that the wet ablation is more effective than that of the dry ablation, and the rate of ablation depth decrease at high energy density and equivalent pulse number. Finally, the FTIR spectra was used to compare the structure of bone powder and the ejected debris during bone ablation, it was found that some bone elements are disappeared in the ejected debris.

2009 – 2011 Assistant Lecturer – Soran University – School of General Science

2012 – 2017 Postgraduate Student – Manchester University – School of Mechanical Engineering  
PhD in Mechanical Engineering

**Thesis Title: Picosecond Laser Generation and Modification of Ag-TiO<sub>2</sub> Nanoparticles for Antibacterial Application**

Supervisor: Professor Lin Li and Co-supervisor: Dr. Zhu Liu

### **Brief Synopsis:**

Silver-titania nanoparticles (Ag-TiO<sub>2</sub> NPs) were synthesised by picosecond (ps) laser ablation in different forms with different characteristics: e.g. reduced energy band gap of the Ag-TiO<sub>2</sub> NPs were produced in ice water, and bimodal Ag-TiO<sub>2</sub> NPs were generated in deionised water (DIW) by hybrid ultrasonic vibration and ps laser ablation of Ag and Ti bulk targets. In addition, a bulk Ti/Ag alloy was used, for the first time, to produce Ag-TiO<sub>2</sub> compound NPs using ps laser ablation in DIW, and novel TiO<sub>2</sub>@Ag core-shell NPs were produced via ultrasonic vibration of the compound NPs. The characteristics of Ag-TiO<sub>2</sub> NPs generated were compared with those of laser generated -Ag, Au and TiO<sub>2</sub> NPs synthesised by nanosecond (ns), picosecond (ps) and femtosecond (fs) pulse lasers in DIW. Another investigation in this work reports a comparison of the characteristics of Au, Ag, Ag-TiO<sub>2</sub>, TiO<sub>2</sub>,

ZnO and iron oxide NPs generated by ps laser ablation in DIW at 532 nm and 1064 nm laser wavelengths. Finally, production of hollow and porous TiO<sub>2</sub> NPs in a single step via high-repetition rate ps laser ablation in DIW is presented.

## EMPLOYMENT

**2015 – 2017**    LIG-BIOWSIE Ltd  
Unit 11, Williams House,  
Williams House, Manchester Science Park  
Manchester, M15 6SE  
England, UK  
0161 342 0515

The title of the position: **Research Engineer in Laser Nano-technology**

**2017 – Now**    Researcher and Instructor at Soran University–Faculty of Education – Department of General Sciences

## SKILLS

### IT

- Confident in use of various software packages: Windows, Microsoft office programs...
- Using programs such as: Matlab, Mathcad...

### Communications

- Worked closely with research colleagues, department staff and external contacts
- Experienced in working with a wide range of students
- Made a lot of presentations to both specialist (academic) and non-specialist audiences

### Supervision:

- Supervised one MSc student – Published three journal papers – Two of them have high impact factors.
- Supervising one PhD student – Published four journal papers – Three of them have high impact factors.

### Committee members:

- Participated seven MSc thesis in Soran University, Salahaddin University, Sulaymania University and Koya University.

### Academic links:

Google Scholar:

<https://scholar.google.com/citations?hl=en&user=mhYoSfkAAAAJ>

ResearchGate:

<https://www.researchgate.net/profile/Abubaker-Hamad-3>

Homepage:

<https://sites.google.com/a/soran.edu.iq/abubaker-hassan-hamad/>

Publons:

<https://publons.com/wos-op/researcher/3498595/abubaker-hamad/>

## PUBLICATIONS:

### 1- Published papers

- 1- Hamad, A., Y. Hassan, *Compact Bone Ablation by CO<sub>2</sub> Laser*. Zanko Journal of Pure and Applied Science, Salahaddin University – Hawler, 2010. **22**(1): p. 107-115.
- 2- Hamad, A., L. Li, Z. Liu, X.L. Zhong and T. Wang, *Picosecond laser generation of Ag–TiO<sub>2</sub> nanoparticles with reduced energy gap by ablation in ice water and their antibacterial activities*. Applied Physics A, 2015. **119**(4): p. 1387-1396.
- 3- Hamad, A., L. Li and Z. Liu, *A comparison of the characteristics of nanosecond, picosecond and femtosecond lasers generated Ag, TiO<sub>2</sub> and Au nanoparticles in deionised water*. Applied Physics A, 2015. **120**(4): p. 1247-1260.
- 4- Hamad, A., L. Li, Z. Liu, X.L. Zhong, H. Liu and T. Wang, *Generation of silver titania nanoparticles from an Ag–Ti alloy via picosecond laser ablation and their antibacterial activities*. RSC Advances, 2015. **5**(89): p. 72981-72994.
- 5- Hamad, A., L. Li, Z. Liu, X.L. Zhong, G. Burke and T. Wang, *The characteristics of novel bimodal Ag–TiO<sub>2</sub> nanoparticles generated by hybrid laser-ultrasonic technique*. Applied Physics A, 2016. **122**(4): p. 1-12.
- 6- Hamad, A.H., L. Li, Z. Liu, X.L. Zhong and T. Wang, *Sequential laser and ultrasonic wave generation of TiO<sub>2</sub>@ Ag core-shell nanoparticles and their anti-bacterial properties*. Lasers in medical science, 2016. **31**(2): p. 263-273.
- 7- Hamad, A., L. Li, Z. Liu, *Comparison of characteristics of selected metallic and metal oxide nanoparticles produced by picosecond laser ablation at 532 nm and 1064 nm wavelengths*, Applied Physics A, 2016. 122:904.
- 8- Hamad, A. L. Li, Z. Liu, X.L. Zhong, *A Single-step Process of Generating Hollow and Porous TiO<sub>2</sub> Nanoparticles by Picosecond Laser Ablation in Deionised Water*, journal of laser micro nanoengineering, 2016.
- 9- Khashan K, Sulaiman G, Hamad A, Abdulameer F, Hadi A, *Generation of NiO nanoparticles via pulsed laser ablation in deionised water and their antibacterial activity*, Applied Physics A, 2017. 123:190.
- 10- Hamad, A. *Nanosecond Laser generation of Silver Nanoparticles in Ice Water*, Chemical Physics Letters 755 (2020) 137782.
- 11- Hamad, A. Khashan, K and Hadi, A. *Silver Nanoparticles and Silver Ions as Potential Antibacterial Agents*. 2020. Journal of Inorganic and Organometallic Polymers and Materials.
- 12- Matin Sedighi, Borhan Arghavani Nia, Abubaker Hassan Hamad, Mazin Sherzad Othman. *Electronic and optical properties of SrS nanosheet in 001 and 101 Directions*. Computational Condensed Matter. 22 (2020) e00445.
- 13- Borhan Arghavani Nia, Abubaker Hassan Hamad, Matin Sedighi. 2021. "Characterization of Strontium Telluride (SrTe) Nanosheets in Different Directions: A Density-Functional Theory Approach" ECS Journal of Solid State Science and Technology. 10(11) 113003.
- 14- Shelan Muhammed Mustafa, Azeez Abdullah Barzinjy, Abubaker Hassan Hamad, Samir Mustafa Hamad. 2022. "Biosynthesis of quantum dots and their usage in solar cells: insight from the novel researches" International Nano Letters. 12(2), pp. 139-151.
- 15- Abubaker H Hamad, Mahmoud A Chawsheen, Ahmed A Al-Naqshbandi. 2022. "Role of Laser Produced Silver Nanoparticles in Reversing Antibiotic Resistance in Some MultidrugResistant Pathogenic Bacteria" ARO-THE SCIENTIFIC JOURNAL OF KOYA UNIVERSITY. 10(1), pp 104-110.
- 16- Mohammad Najat Rashko, Mazin Sherzad Othman, Abubaker Hassan Hamad. 2022. "Effects of Doping Cadmium Atoms on the Electronic and Optical Properties of (n, 0) Zigzag SWCNTs: DFT Approach" 11(8)081009.
- 17- Shelan M Mustafa, Azeez A Barzinjy, Abubaker H Hamad, Samir M Hamad. 2022. "Betaine-based deep eutectic solvents mediated synthesis of zinc oxide nanoparticles at low temperature" Ceramics International. 48(19), pp28951-28960.

- 18- Shelan M Mustafa, Azeez A Barzinjy, Abubaker H Hamad, Samir M Hamad. 2022. "Green synthesis of Ni doped ZnO nanoparticles using dandelion leaf extract and its solar cell applications" 48(19), pp29257-29266.
- 19- MN Rashko, AA Barzinjy, SM Hamad, AH Hamad. 2022. Mechanical Properties of Carbon Nanotubes (CNTs): A Review. Eurasian Journal of Science & Engineering. 8(2).
- 20- Mohammad Najat Rashko, Abubaker Hassan Hamad, Mazin Sherzad Othman. 2023. "Impacts of doping cadmium atoms on the mechanical properties of (n, 0) zigzag SWCNTs: DFT approach". Diamond and Related Materials. 109681.
- 21- Shelan M Mustafa, Azeez A Barzinjy, Abubaker H Hamad. 2023. "An environmentally friendly green synthesis of Co<sup>2+</sup> and Mn<sup>2+</sup> ion doped ZnO nanoparticles to improve solar cell efficiency" Journal of Environmental Chemical Engineering. 11(2) 109514.

## 2- Book Chapter

1. Abubaker Hamad. 2016. *Effects of Different Laser Pulse Regimes (Nanosecond, Picosecond and Femtosecond) on the Ablation of Materials for Production of Nanoparticles in Liquid Solution*. Richard Viskup. *High Energy and Short Pulse Lasers*. ISBN 978-953-51-4758-9, InTech.
2. Abubaker Hamad, Khawla S. Khashan and Assel Hadi. 2016. *Laser Ablation in Different Environments and Generation of Nanoparticles*. Dongfang Yang. *Laser Ablation*. InTech.
3. Ahmed Alshaer, Fatema Rajab and Abubaker Hamad. 2017. Short Pulsed Laser Surface Texturing of Metallic Implants for Biomedical Applications. In Carola Bellucci (Ed). *Laser Ablation: Advances in Research and Applications*. New York. USA. NOVA SCIENCE PUBLISHER, INC. ISBN 978-1-53612-405-7
4. Abubaker Hamad and Samir Mustafa. 2019 "Plasmonic Effect of Gold Nanoparticles on Enhancing Solar Cell Efficiency" In Joshua R. Chin (Ed), *Gold nanoparticles: Advances in Research and Applications*. Pp. 27-62 New York. USA. NOVA SCIENCE PUBLISHER, INC. ISBN 978 -53616-579-1