Title: Lasers and their applications in nanotechnology as a photonic device

Talebzadeh, Seyyedeh Ladan[1*],

1 *Depatment of Electrical and Electronic Engineering, University of Tbriz, Tabriz, Iran*
* *Author's E-mail: s.ladan.talebzadeh97@ms.tabrizu.ac.ir*

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1 Abstract

In the fabrication of many nanotechnological devices and structures, photonics is practical and important. To characterize and measure nanostructures' properties, photonic techniques are essential. Several significant applications of photonics and nanotechnology combined together, such as diode lasers, optical couplers, light emitting diodes (LEDs), solar cells, photodetectors, neuromorphic, metamaterials, metasurfaces, and biochemical technologies. Since lasers are employed both to manufacture nanostructures and to determine their attributes, they play an indispensable role in nanotechnology.[1] There are several types of lasers used in nanotechnology due to their wide range of applications. Hence, in this presentation, we first introduce semiconductor lasers as a substantial device and we clarify their properties and performance.[2] Next, we elaborate on quantum definitions as well as the background to the quantum structures.[3] Subsequently, we discuss various kinds of semiconductor lasers like quantum dot (QD) lasers, quantum cascade (QC) lasers, vertical cavity surface emitting lasers (VCSEL), and optical injection-locked (OIL) lasers. Finally, we examine the recent developments of OIL Lasers to improve frequency response and as a result, enhance the output power, stabilization conditions, along with noise elimination.[4,5]

2 Images

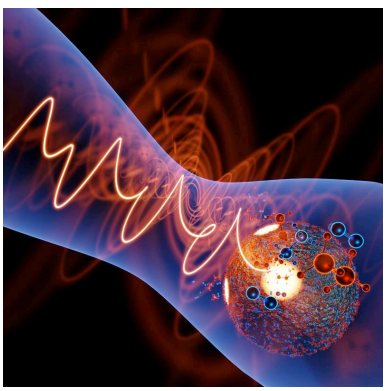


Figure 1: A nanoparticle in the field of a femtosecond laser pulse with tailored waveform and polarization.

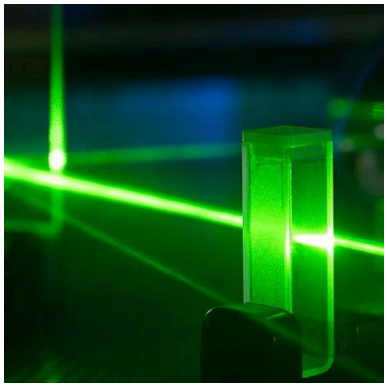


Figure 2: Sustainable fusion reactions ignited by short laser pulses, generated by factory-sized systems.

3 Biography

Seyyedeh Ladan Talebzadeh has completed her master's degree in Electrical and Electronic Engineering (Micro and Nano-electronic Devices) from the University of Tabriz (one of the top five high-ranked universities in Iran) with an honor of 2^{nd} CGPA, and her bachelor's degree from University of Guilan. Her main research field encompasses OIL lasers. She is the first writer of three under-submission journal papers and currently looking for Ph.D. positions at top world universities.

4 Presenting author details



Full Name : Seyyedeh Ladan Talebzadeh
Contact number : (+98)9112411505
Linked In account :
http://www.linkedin.com/in/ladan-talebzadeh/
Category : Keynote speaker
Passport Number : M53172030
Gmail : ladan.talebzadeh1@gmail.com

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