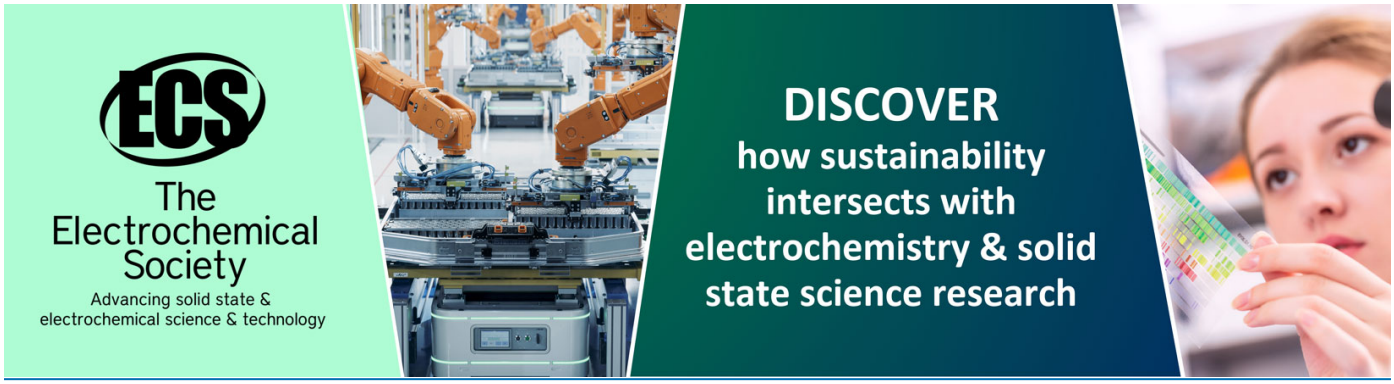
FTIR- Spectrum of Zinc nanoparticle by Laser ablation technique in liquid



FTIR- Spectrum of Zinc nanoparticle by Laser ablation technique in liquid

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Abstract:
In this research zinc nanoparticles metal were prepared by laser ablation method using zinc novel metal. The Zn nanoparticles were characterized by Fourier transform infrared (FTIR) .The optical properties of particles were studied an FTIR spectrum . FTIR spectra confirmed the adsorption of surfactant molecules at the surface of Zn nanoparticles and presence of Zn bonding. The result reported increase in wavenumber with energy supplied and reduce in transmittance.

Keywords. Pulsed laser ablation, Zinc nanoparticles, FTIR spectrum

1. Introduction

A metallic element nanoparticles are the topic of focused research thanks to their unique electronic, optical, mechanical, magnetic and chemical properties that are significantly different from those of bulk [1][2]. The reported data showed that the optical properties of Zn nanoparticles prepared by PLAL trusted many parameters like laser energy ,laser wavelength, laser pulse duration and liquid type [3][4]. during this research we measured The optical properties of particles.

2. Experimental

Zinc nanoparticles were produced by pulsed laser ablation in liquid of a bit of zinc metal in an ultrapure deionized water. A metal plate of Zinc with high purity (99.86 %)). a bit of metal was irradiated by the focused output of the second harmonics of pulsed nanosecond Nd : YAG laser(type HUAFEI) operating at 5 Hz frequency, 800 and 900 mJ energy. Experimental arrangement is shown in figure 1. The wave length 1064 nm Nd : YAG laser and thus the amount of applied pulses 200 pulses. the space between the target and laser source is 10 cm at room temperature . FT-IR spectroscopy ALPHA_II_ECO-ATR – Germany .

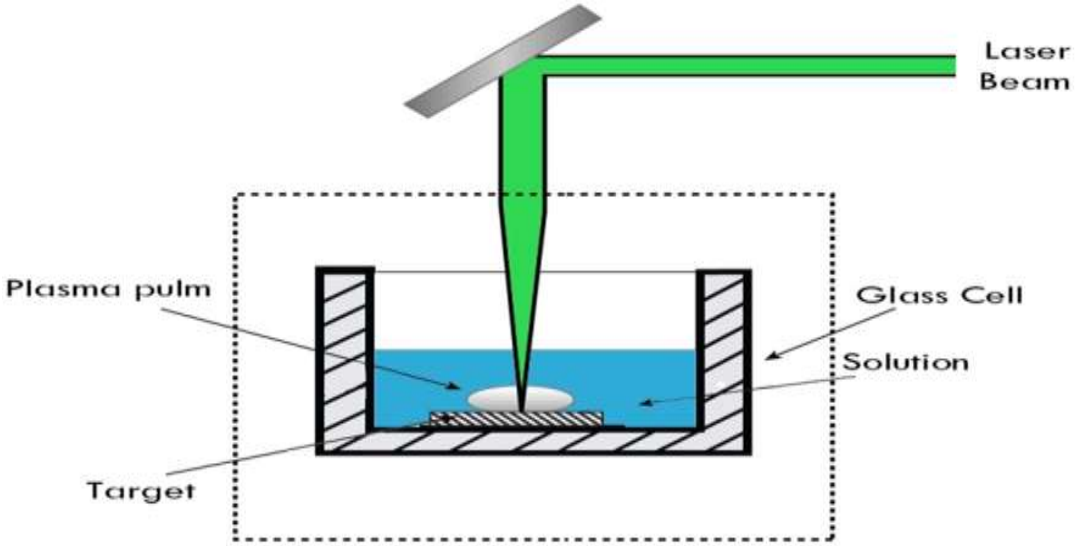

Figure 1: Laser Ablation System.

3. Results and discussion

Figure 3 and 2 shows FTIR spectra of Zn nanoparticles. Infrared studies were administered so as to determine the purity and nature of the metal nanoparticles. Metal generally give absorption bands in region above 1000 cm-1 arising from inter-atomic vibrations. the height observed at 3255.33 and 1639.33 cm-1 in 800 mJ. the height at 3258.32 and 1639.28 cm-1 in 900 mJ . FTIR spectra observed of zinc nanoparticles in their investigation Zinc (Zn) nanoparticles was synthesized by the pulsed laser ablation at temperature .We showed two bonds the primary bond sharp and another wide .Two peak represent force the bond, second peak could also be a robust bond. When increase the energy noted the wavenumber increase(see table1) and thus the energy of bond increase while transmittance decrease and thickness

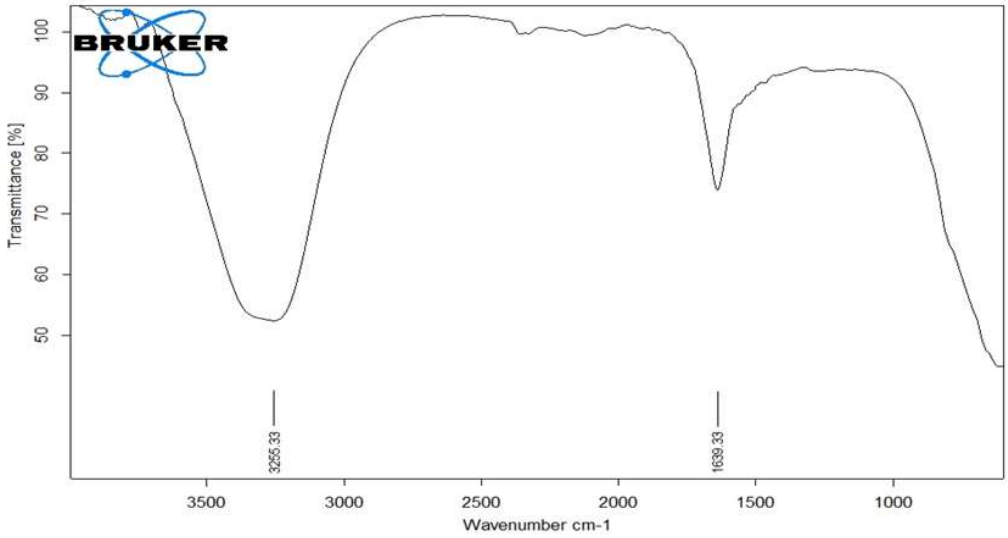

Fig.2: FTIR of Zn nanoparticle by pulsed laser ablation in 800 mJ

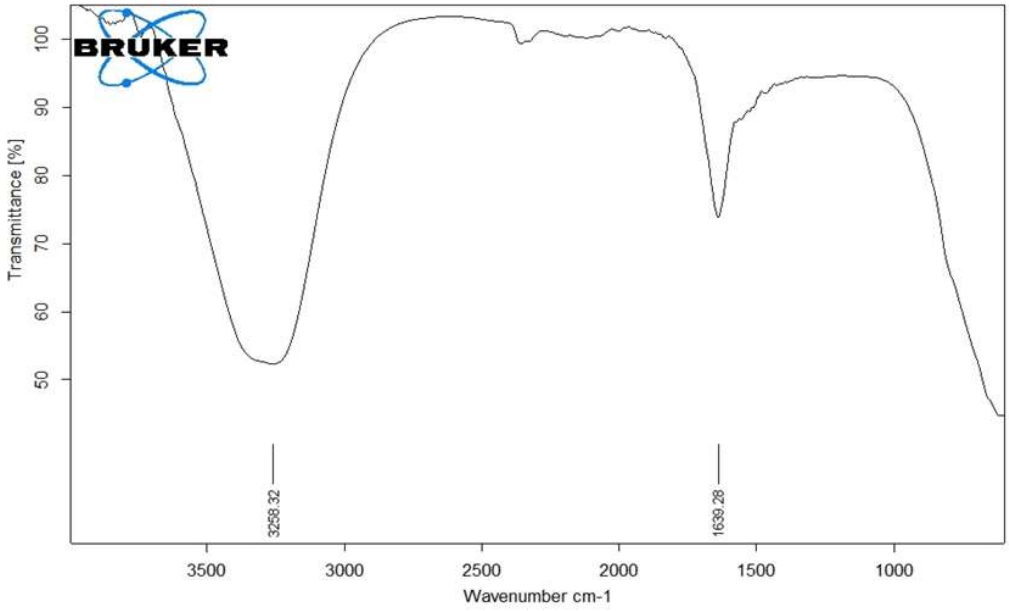

Fig.3: FTIR of Zn nanoparticle by pulsed laser ablation in 900 mJ

Table.1: (FTIR) of Zinc

Metal Nanoparticles	Energy[mJ]	Pulses number	Wave number[cm^-1]
Zn	800	200	1639.33- 3255.33
Zn	900	200	1639.28- 3258.32

4. Conclusions

The Zinc nanoparticle synthesized during this work have specific advantages over other techniques. simple, fast , non-toxic and non-contamination method for the preparation of nanoparticles. We noted increase in wavenumber this means increase in bond energy and decrease in wavelength and thickness.

Acknowledgments

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