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Abstract

Size estimation of suspended nanoparticles produced by liquid-phase pulsed laser ablation using multi angle Near-Infrared light scattering transmissometry and nephelometry

Tchami Jean Hilaire
University of Ngaoundéré, Cameroon.

Abstract:

It is admitted that Liquid-Phase Pulsed Laser Ablation (LP-PLA) attracts more and more much attention and has been presented as an effective and innovative method of synthesis of functional nanoparticle materials. In our previous study, we have shown that the concentration of produced nanoparticles is linear with time, meaning that the production of nanoparticles by Pulse Laser Ablation is a controllable and precise process. This paper completes the first study by carrying a particular attention on average size estimation of the generated nanoparticles. The study is based on the use of a simple Multi Angle Near-Infrared Light Scattering (MA N-IR LS) device, which in real time, estimates easily by transmissometry and dual angles nephelometry, the average size of copper and iron nanoparticles produced by LP-PLA process. The developed experimental setup, mounted on a simple electronic's instrumentation board and a specialized software has shown that the method can be easily used to estimate size evolution of produced nanoparticles; justified by the fact that our experimental curves can be correlated to the size of Cu and Fe nanoparticles, present in the aqueous medium. The software implements Beer-Lambert law and Rayleigh theory at two different angles which, after the nanoparticles concentration calculation, evaluates their average size, based on exploitation of the reverse equations correlated to the concentration after multi-angle observations. With our integrated device, only three angles of light scattering theorie are sufficient to evaluate judiciously the global size of the nanoparticles generated during a Femto-Second Laser Ablation process. The users would just have to correctly install our device in the laser ablation process plan.

Biography:

Tchami J.H is Ph.D. Doctor in Process Engineering, specialist in : Automation, Command, Equipment and Modelling. University of Ngaoundéré, Cameroun. He is Assistant Lecturer in National Advanced School of

Agro-Industrial Sciences (ENSAI), teaching courses: Instrumentation and sensors, Regulation, Automation, Computer Science for Engineering, Electronic, Electrotechnology, Microprocessor and instrumentation technologies, Practical works in electrical engineering. He has published 2 papers in international journals and attended 3 international Conference. Member of the Cameroon Physical Society, he as obtained this last three years many scientific and technology distinctions: - African Semi-finalist of the 2018 APSA Innovation Challenges for Science and Technology. Technologies and Innovations for Sustainable Development, Addis Ababa, Ethiopia - First Prize of Science and Technologies of the 2017 edition of the Cameroon University Games, Bamenda - First Prize of the 2016 edition of Cameroon National Technology and Innovation Days. Since that he is Junior Lecture, he is trainer of many students and projects in electrical engineering applied for process plan.

Recent Publications:

1. Tchami et al, (2019) Real time determination in aqueous medium of the chemical nature and concentration of suspended nanoparticles produced by pulsed laser ablation using a simple infrared turbidimeter and an optical ber probe
2. Tchami et al,(2014) Infrared Turbidimeter for Nephelometric,Turbidimetric and Ratio Control and Monitoring of Water during Treatment. (IJERT) ISSN : 2278-0181 Vol.3 Issue2. February 2014.

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