AUTOMATED SYSTEM FOR NANOPARTICLES SYNTHESIS VIA ARC-DISCHARGE IN LIQUIDS

L. Hernandez-Tabares\textsuperscript{1}, J. G. Darias-González\textsuperscript{1}, J. Arteche-Díaz\textsuperscript{1}, E. Carrillo-Barroso\textsuperscript{2}, L. M. Ledo-Pereda\textsuperscript{1}, Neil Torres-Figueredo\textsuperscript{1,3}, L. F. Desdin-Garcia\textsuperscript{1}

\textsuperscript{1}Centro de Aplicaciones Tecnológicas y Desarrollo Nuclear (CEADEN). Calle 30 y 5ta Ave. Miramar, Habana, Cuba, C.P 11300. \textsuperscript{2} Instituto de Cibernética, Matemática y Física (ICIMAF). Calle 13e / C y D. Vedado, La Habana, Cuba. C.P 10400. \textsuperscript{3} Centro de Investigación en Ciencia Aplicada y Tecnología Avanzada, Unidad Legaria (IPN). Calzada Legaria No. 694, Miguel Hidalgo, Irrigación, C.P. 11500 Ciudad de México, México.

Submerged arc discharge in liquids has shown to be a promising method to synthesize a wide variety of nanomaterials. However, it requires an accurate arc current control to ensure the desired purity and structure of the products. A fluctuating arc current increases the dispersion in size distribution, as well as in the obtained nanoparticles structure pattern. Consequently, the arc current stability is essential to ensure the product homogeneity and quality. A system, which ensures high stability of the arc discharge is presented. The systems have three basic elements: an electrode gap micro positioning system controlled by a feedback arc current measurement, a current’s stabilization element and a data acquisition system to record the magnitudes of the relevant physical parameters. The most suitable algorithm for micro positioning system was determined. The utilization of step motor gave an additional advantage in measuring the anode displacement. The stabilization element employed improves the current and power stability by 4 and 2.7 times respectively. The data acquisition system allows taking control and information about the relevant parameters of the process and the interaction between them. This system based on direct arc current measurement is superior, in terms of achieving higher stability and current sensibility, to the ones based on arc voltage or arc light emission. It is also an adaptable tool to carry on further experiments.

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Presenting author’s email: neiltorres84@yahoo.es