



Relevant developments and new insights on Sonochemistry

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Abstract: Sonochemistry is undergoing a reemerging activity in the last years with an increasing number of papers appearing in a wide range of peer review journals. Applied studies cover environmental treatments, synthesis or characterization of nanostructures, polymeric materials synthesis, analytical procedures, films preparations, membrane preparations among other interesting applications. Fundamental analyses are also carried out focused on electrochemical processes using unconventional solvents, elucidation of mechanisms, combination with other techniques.... The interrelation between Electrochemistry and Acoustics presents mutual benefits for both disciplines, providing interesting information about the bubble dynamics for acoustics physicists and a higher number of possible applications for electrochemists. However, the vast majority of this research has been carried out at laboratory scale with individually designed systems based on ultrasonic horns dipped into traditional glass electrochemistry vessels. It is remarkable that even with this rudimentary experimental set-up many interesting results have been generated however sonochemistry has suffered a few drawbacks related to reproducibility, scale-up and design aspects which have slowed its development. Almost certainly the reason for this is the lack of reactors that have been purpose built for sonochemistry. There have been many attempts to build lab-scale systems e.g. for electroanalysis, nanomaterials synthesis and the electrooxidation of organic pollutants but the results are often contradictory. A few groups have attempted to characterize lab-scale sonochemical reactors adapted as sonoelectrochemical reactors but the true optimisation of such reactors requires contributions from many disciplines including physics, fundamental and applied electrochemistry, chemical engineering and material science.

Key words: ultrasound, electrochemistry, cavitation, fluid flow, current distribution, electrocatalysis.