Ultrasonics Sonochemistry 87 (2022) 106050

Contents lists available at ScienceDirect

Ultrasonics Sonochemistry

journal homepage: www.elsevier.com/locate/ultson

Editorial

# Special issue on "sonochemistry in asia 2021″

To highlight or introduce researchers who are working in the sonochemistry field in ASIA, a special issue was arranged on "Sonochemistry in Asia 2021″. 21 papers have been accepted to be published in this issue focusing on both theoretical and as well as experimental work on very important research topics.

Reshma et al. [1] have described in detail the highly sensitive and selective detection of glutathione using an ultrasonic aided synthesis of graphene quantum dots embedded over amine-functionalized silica nanoparticles (GQDs-SiNPs). They have illustrated that chemical synthesis assisted by ultrasonication reduces the reaction time and the amount of chemicals used. Besides ultrasonication has ledto the formation of nanoparticles with different morphology. GQDs-SiNPs on glassy carbon electrode was found to be compatible for the detection of glutathione in real sample analysis.

Bae et al. [2] prepared two different $TiO_2$ nanoparticles one via direct sonication using an ultrasonic horn while the second one is an indirect approach using an ultrasonic cleaner. They noticed that the electron mobility was greatly increased in the sample prepared via the ultrasonic horn. Further, they found that the recombination resistance of the ultrasonic horn sample was higher compared to the conventionally prepared sample. In addition, they have concluded that the energy conversion efficiency of fabricated DSSC was significantly improved while using ultrasonic horn samples.

A model for cavitation nucleation in an elastic micro-cavity is proposed by Fan et al. [3] They used the Rayleigh-Plesset-like equation to prove radial oscillation and translational motion occur in the cavitation bubble model. Based on the observation a theoretical model was proposed to describe the growth of gas nuclei into cavitation bubbles and their nonlinear behaviour inside an elastic spherical liquid cavity.

To achieve a smaller mean particle size of azithromycin and to enhance the bioavailability, Sabnis et al. [4] followed ultrasound-assisted crystallization. Upon varying the ultrasonic power, time, and temperature, the best size reduction of up to 80% is obtained at low temperature ($<10$ °C), that too within 5 min of sonication. A scale-up approach has also been demonstrated using ultrasonic flow cells at substantially higher volumes and optimum input ultrasonic power.

Choi et al. [5] investigated both sonochemical and sonophysical activities for ultrasonic desorption/extraction processes comprising mill-sized glass beads. A lower sonochemical activity in the heterogeneous system compared to the homogeneous system was observed. Further, no sonophysical activity was observed when the beads were attached to the bottom whereas high sonophysical activity was noticed when the bead size is small.

Delignification is necessary for converting biomass to value-added products and for which ultrasound-assisted process can provide a synergetic effect to generate higher production of a value-added product. Kininge and Parag [6] demonstrated enhanced delignification using ultrasonic reactors to develop green and sustainable technology. Ultrasound treatment caused morphological changes, resulting in enhanced surface area and crystallinity which are responsible for enhanced delignification.

Snehya et al. [7] generated biohydrogen upon performing saponin surfactant coupled sonic pre-treatment on Ulva fasciata (marine microalgae). The chemical oxygen demand solubilization was found to be more in the presence of saponin surfactant coupled with sonic pre-treatment. Besides author concentrates on scaling up the pilot plant process to arrive at a further optimum operating condition for commercial plants and study the actual economics of the processes.

Wu et al. [8] demonstrated a universal stabilization mechanism regarding emulsion microstructure and tunable rheological properties generated via turbulence-induced low frequency (20 kHz) ultrasound or high-pressure homogenization approach. Such emulsion gels have emerging applications in the formulation and processing of food, cosmetics, or pharmaceuticals and as well as in material science.

Oil-in-water emulsions stabilized by milk protein concentrate (MPC70) were investigated by Zhang et al. [9] using skim milk with a varied amount of oil volume fraction to highlight dairy emulsions with tailored textures. They noticed high viscosity pseudoplastic material formation at $\geq$ 35% oil concentration and $\geq$ 3 s sonication times.

Jin et al. [10] used reactive free radicals produced by ultrasonic irradiation to produce Mn-Ni-Fe tri-metallic oxide. Generates hierarchical pores upon anchored such tri-metallic oxide on polymer grafted carbon black which contributes to enhanced electrocatalytic performance (oxygen reduction reaction (ORR)/oxygen evolution reaction (OER)) towards rechargeable zinc-air batteries.

Perovskite nanostructures ($LaCo_xFe_{1-x}O_3$ $(0 \leq x \leq 1)$) with distinct B-site were prepared via a simple ultrasonic approach to harvest photon energy and as well as the removal of environmental pollutants by Maridevaru et al. [11] Such ultrasonic facile approach can be used to tailor the essential features of ferrite-based perovskite catalysts for visible range photocatalysis.

Pandan plant extract is used in the food industry due to its unique pleasant taste, aroma, and as well as attractive bright green colour. Omer et al. [12] attempted sono-encapsulate to entrap the volatile compound (2-acetopyrolline) present in it and prolong its aroma in food products at least for a month.

Yang et al. [13] used a low-intensity ultrasonic device to generate an enhanced yield of ethanol from Saccharomyces cerevisiae. They have suggested that increased intracellular glucose and nicotinamide adenine dinucleotide contents are the key metabolites for ethanol synthesis upon

https://doi.org/10.1016/j.ultsonch.2022.106050

Available online 25 May 2022

ultrasonication.

To protect anthocyanin pigments during dehydration of berry fruits, Gong et al. [14] demonstrated a combination of phenolic acid co-pigmentation pretreatment and ultrasonic drying could be a promising method. They concluded that sonication intensified both internal water diffusion and external water exchange (effective diffusivity of water), compared to air drying alone.

Sun et al. [15] proposed optical structures of cavitation generation units by combining genetic algorithms and computational fluid dynamics for advanced rotational hydrodynamic cavitation reactors. In their work, they highlight the occurrence of process intensifications by advanced rotational hydrodynamic cavitation reactors through fundamental understanding, design, and application.

Numerical simulations for sonochemistry such as optimum bubble temperature for the production of oxidants inside an air bubble were discussed by Yasui et al. [16] Commercially available FEM (finite element method) software was used for such numerical simulations. Also discussed numerical simulations of sonochemical production of nanoparticles as well as the spatial distribution of acoustic amplitude in a sonochemical reactor.

Wu et al. [17] demonstrated how the total cavitation noise intensity was calculated by estimating the real cavitation noise spectrum over the full frequency domain instead of artificial adding inaccurate filtering processing. Such real-time measurements may be easy to implement in devices that are suitable for industrial applications.

Low et al. [18] highlighted ultrasound-driven synthesis as a pragmatic solution to satisfy the growing demand for nanobiomaterials. Materials synthesis via such processes has improved properties and performance over the conventional approach and hence sono-nanotechnolgy has drawn attraction in the recent days.

For the removal of persistent organic pollutants (polychlorinated biphenyls) present in contaminated soils, Lee et al. [19] preferred ultrasonic soil washing processes compared to conventional mechanical mixing processes. Further, noticed polar solvents have significantly increased washing efficiencies compared to nonpolar solvents.

Gao et al. [20] used ultrasound irradiation for viscosity reduction of heavy oil in the presence of tetralin and ethylene glycol. The results illustrate that the best viscosity reduction time is attained upon ultrasound illumination for 6 minutes which may be due to the breaking of long chains of carbons by cavitation, thermal and mechanical effects of ultrasound.

Acoustically vaporized nanodroplets were used to open the blood-brain barrier to indirectly demonstrate ultrasound-facilitated trans-membrane permeability (i.e., by delivering gene/drugs into the deep site of brain tissues more safely and effectively) by Song et al. [21].

## References


[1] R. Kaimal, V. Vinoth, A. Shrikrishna Salunke, H. Valdes, R.V. Mangalaraja, B. Aljafari, S. Anandan, Highly sensitive and selective detection of glutathione using ultrasonic aided synthesis of graphene quantum dots embedded over amine-functionalized silica nanoparticles, Ultrason. Sonochem. 82 (2022), 105868.

[2] J.H. Bae, S.B. Do, S.H. Cho, K,, M., Lee,, S., E., Lee,, T.O., Kim,, $TiO_2$ treatment using ultrasonication for bubble cavitation generation and efficiency assessment of a dye-sensitized solar cell, Ultrason. Sonochem. 83 (2022), 105933.

[3] X. Zhang, F. Li, C. Wang, J. Guo, R. Mo, J. Hu, S. Chen, J. He, H. Liu, Radial oscillation and translational motion of a gas bubble in a micro-cavity, Ultrason. Sonochem. 85 (2022), 105957.

[4] S.S. Sabnis, S.D. Singh, P.R. Gogate, Improvements in azithromycin recrystallization using ultrasound for size reduction, Ultrason. Sonochem. 83 (2022), 105922.

[5] J. Choi, Y. Son, Quantification of sonochemical and sonophysical effects in a 20 kHz probe-type sonoreactor: Enhancing sonophysical effects in heterogeneous systems with milli-sized particles, Ultrason. Sonochem. 82 (2022), 105888.

[6] M.M. Kininge, P.R. Gogate, Intensification of alkaline delignification of sugarcane bagasse using ultrasound assisted approach, Ultrason. Sonochem. 82 (2022), 105870.

[7] A.V. Snehya, M.A. Sundaramahalingam, J. Rajeshbanu, S. Anandan, P. Sivashanmugam, Studies on evaluation of surfactant coupled sonication pretreatment on Ulva fasciata (marine macroalgae) for enhanced biohydrogen production, Ultrason. Sonochem. 81 (2021), 105853.

[8] W. Li, G.J.O. Martin, M. Ashokkumar, Trubulence-induced formation of emulsion gels, Ultrason. Sonochem. 81 (2021), 105847.

[9] R. Zhang, L. Luo, Z. Yang, M. Ashokkumar, Y. Hemar, Formation of high power ultrasound of aggregated emulsions stabilised with milk protein concentrate (MPC70), Ultrason. Sonochem. 81 (2021), 105852.

[10] B. Jin, P. Bai, Q. Ru, W. Liu, H. Wang, L. Xu, Ultrasonic synthesis of Mn-Ni-Fe trimetallic oxide anchored on polymer grafter conductive carbon for rechargeable zinc-air battery, Ultrason. Sonochem. 81 (2021), 105846.

[11] M.C. Maridevaru, S. Anandan, B. Aljafari, J.J. Wu, $LaCo_xFe_{1-x}O_3$ $(0 \leq x \leq 1)$ spherical nanostructures prepared via ultrasonic approach as photocatalysts, Ultrason. Sonochem. 80 (2021), 105824.

[12] N. Omer, C. Yeun-Mun, N. Ahmad, N.S. Mohd Yusof, Ultrasound-assisted encapsulation of Pandan (Pandanus amaryllifolius) extract, Ultrason. Sonochem. 79 (2021), 105793.

[13] Y. Yang, W. Ren, H. Xu, L. Cheng, M.F. Dapaah, R. He, H. Ma, Incorporating transcriptomic-metabolomic analysis reveal the effect of ultrasound on ethanol production in Saccharomyces Cerevisia, Ultrason. Sonochem. 79 (2021), 105791.

[14] W. Gong, D. Li, Y. Wu, S. Manickam, X. Sun, Y. Han, Y. Tao, X. Liu, Sequential phenolic acid co-pigmentation pretreatment and contact ultrasound-assisted air drying to intensify blackberry drying and enhance anthocyanin retention: A study on mass transfer and phenolic distribution, Ultrason. Sonochem. 80 (2021).

[15] X. Sun, Z. Yang, X. Wei, Y. Tao, G. Boczkaj, J.Y. Yoon, X. Xuan, S. Chen, Multi-objective optimization of the cavitation generation unit structure of an advanced rotational hydrodynamic cavitation reactor, Ultrason. Sonochem. 80 (2021), 105771.

[16] K. Yasui, Numerical simulations for sonochemistry, Ultrason. Sonochem. 78 (2021).

[17] P. Wu, X. Wang, W. Lin, L. Bai, Acoustic characterization of cavitation intensity: A review, Ultrason. Sonochem. 82 (2022).

[18] S.S. Low, M. Yew, C.N. Lim, W.S. Chai, L.E. Low, S. Manickam, B.T. Tey, P.L. Show, Sonoproduction of nanobiomaterials – A critical review, Ultrason. Sonochem. 82 (2022), 105887.

[19] D Lee, Y. Son, Ultrasound-assisted soil washing processes using organic solvents for the remediation of PCBS-contaminated soils, Ultrason. Sonochem. 80 (105825) (2021).

[20] J Gao, C. Li, D. Xu, P. Wu, W. Lin, X. Wang,, The mechanism of ultrasonic irradiation effect on viscosity variations of heavy crude oil, Ultrason. Sonochem. 81 (105842) (2021).

[21] R Song, C. Zhang, F. Teng, J. Tu, X. Guo, Z. Fan, Y. Zheng, D. Zhang,, Cavitation-facilitated transmembrane permeability enhancement induced by acoustically vaporized nanodroplets, Ultrason. Sonochem. 79 (105790) (2021).


Jun-Jie Zhu, Hesheng Xia, Younggyu Son, Xiaoge Wu, Yang Tao, Sambandam Anandan