JUAN A. GALLEGO-JUÁREZ (Curriculum Vitae Summary)

Academic Degrees
Doctor Honoris Causa, University of Santiago de Chile, 2004
Doctor Physical Sciences, University of Madrid, 1971
Doctor Physics, University of Rome, Italy, 1970
Master Physical Sciences, University of Madrid, June 1966

Professional Positions
2017- President of the company PUSONICS S.L
2008-2017: Founder and Principal Scientific Adviser of the spin-off company PUSONICS SL
2012-2017: Professor ad Honorem, CSIC
1988-2011: Research Professor, CSIC
1991-2003: Director, Institute of Acoustics CSIC
1994-2002: Director, Center for Physics Technologies, CSIC
1971-1975: Founder and Head of the Ultrasound Laboratory, Center for Physics Research
1975-1994: Head, Structural Research Unit of Ultrasonics, Institute of Acoustics
1973-1988: Scientific Researcher, CSIC
1971-1972: Scientific Collaborator, CSIC
1969-1970: Scientific Collaborator, Institute of Ultracoustics, CNR
1966-1970: Postgraduate Fellow, CSIC and CNR
1965-1966: Graduate Fellow, CSIC

CSIC: Higher Council for Scientific Research of Spain
CNR: National Research Council of Italy

Other Professional Qualifications

- President of the 19th International Congress on Acoustics (ICA), Madrid 2007
- Organizer of the Ultrasonics International Conference, Madrid 1989
- Member of the Boards:
  - International Commission for Acoustics (1998-2007)
  - World Congress on Ultrasound (1993-2006)
  - International Congress on Ultrasonics (2006- 2011)
  - Spanish Acoustical Society (1991-2015)
- Member of Editorial Boards of the Journals
  - Ultrasonics (1979-2002)
  - Acustica/ Acta Acustica (1993-2011)
- Fellow
  - Acoustical Society of America
  - British Institute of Acoustics
- Member
  - New York Academy of Sciences
  - IEEE
  - Ultrasonic Industry Association
- Chairman of the Technical Committee on Ultrasound of the European Acoustical Association (2002-2007)
- Member of Scientific Committees (20) of national and international congresses (1991-2009)

Awards

- Rayleigh Medal, premier award of the Institute of Acoustics, awarded to persons of undubted renown for outstanding contributions to acoustics(2017)

- Distinguished Service Award **(**Golden Whistle Award **),** International Congress on Ultrasonics (2011)
- Member of Merit, Spanish Acoustical Society, 2011
- Gold Medal, University of Santiago de Chile (2004)
- Honor Diploma, Portuguese Acoustical Society (2004)
- First Prize for Technological Innovation, Babcock Foundation (1995)
- First Prize to Scientific Research, Ph.D. Thesis, Saving Bank of Cordoba 1971

Contribution to Research and Development

In a career of almost fifty years Prof Juan A. Gallego-Juárez has contributed to acoustics over 300 publications and 43 patents. He has been invited lecturer in more than 45 international conferences and is the author of over 200 contributed papers to international and national conferences. He has given lectures and courses all over the world (USA, Denmark, France, Australia, Italy, Argentina, Chile, Mexico, Germany, China, Spain and Sweden). He has participated in about one hundred of research projects mostly as principal investigator. His research work has always been related to ultrasound and more specifically to power ultrasound in gases and multiphase media where he has been a pioneer in exploring new fields of application. His major contribution to Power Ultrasound has been the design, development and implementation at laboratory and industrial level of a new family of power sonic and ultrasonic generators with extensive stepped-plate radiators for use in gases,liquids and multiphase media. Furthermore he has studied and developed in such specific media a series of new technologies for application of the ultrasonic energy to environmental treatments (fine particle removal, sludge filtration), food processing (defoaming, drying, extraction) and manufacture (textile washing, debubbling of coating layers, pigment dispersion). In addition he has carried out extensive theoretical and experimental studies about the nonlinear acoustic propagation of high-intensity waves in such low density/inhomogeneous media as well as in the metallic and piezoelectric materials constituting the power transducers under high vibratory stresses.

Power Ultrasound, which is the field devoted to the use of ultrasonic energy to produce permanent changes in the treated medium, is considered an emerging, environment friendly and energy saving technology. Presently there is a growing interest for the application of power ultrasound in a large variety of operations. It can be attributed to the special characteristics of ultrasonic energy to provide a sustainable and versatile technological alternative for the development of enhanced energy efficient processes. In fact, ultrasonic waves offer a clean mechanical non-ionizing radiation that due to its effectiveness, low instrumental needs compared with other techniques and reduced process time, make their application to be considered a green and sustainable technology.

Until recently, most of the ultrasonic processes have dealt with the treatment of solid and liquid media. To be mentioned plastic and metal welding, machining, metal forming in solids and cleaning, atomisation, emulsification and dispersion, degassing and sonochemical reactions in liquids as the current more representative conventional applications of power ultrasound. However, there are other important media, including gases and multiphase media (gas with particles, bubbles or drops in suspension and liquids with gas content or porous solids with liquid inside), to which the application of ultrasonic energy has been notoriously discarded for long time. The reason of such a situation lies in the difficulty to efficiently generate and propagate ultrasound through low density and inhomogeneous media.The creation and development by Prof.Gallego-Juárez of a novel family of power ultrasonic generators with extensive radiating surfaces of stepped profile has significantly contributed to address this challenge by allowing the implementation, at laboratory, semi-industrial and even industrial scale, of a number of new ultrasound assisted technologies for environmental, food, and manufacturing sectors. The development of these technologies, generally based on the exploitation of the nonlinear effects created by high intensity waves, has been carried out through theoretical and experimental studies in the field of power ultrasound whose results have been collected in a large number of scientific publications.

Such results have been used to determine the mechanisms activated by ultrasonic energy in the new processes treated in low density and multiphase media.

Moreover Prof. Gallego-Juárez founded a spin-off company PUSONICS S. L, for the industrialization of the new power ultrasonic technologies and processes.

A brief description of the main technologies developed as well as the non-linear effects investigated is given below and wider explanation about their foundations can be found in the publications and patents herein referenced.

Environmental Processes

Two main processes have been developed in this area: fine particle removal and sludge filtration.

Fine particle removal

The presence of suspended airborne particles (specially very fine particles) in the environment is generally undesirable and dangerous. In fact such tiny particles constitute a major health hazard because their ability to penetrate deeply in the respiratory tissues and their long stay in suspension. Therefore it is necessary to deal with them by precipitation of the disperse phase. Ultrasonic vibrations by agglomeration and precipitation processes might have an important role to play in cutting down the concentration of solid and liquid particles in smokes, mists and exhaust gases in general. Prof Gallego-Juárez has been working for a long time in the study of such mechanisms as well as in the development of industrial applications. By using the new power generators he developed and patented a multifrequency acoustic agglomerator that has been tested at semi-industrial scale as a preconditioning system placed upstream of a conventional electrostatic filter. The important objective for the combination of two systems is to remove micron and submicron -sized particles which usually are not precipitated by the electrostatic filter alone. As a result, reductions in the range of 40-70 % in the micron and submicron size particles over the efficiency of the electrostatic filter were obtained with flow rates of about 2000 m3/h, a power applied of about 1600 W and treatment time of 2-3 seconds. These results represent a significant improvement particularly bearing in mind the very small size of the particles, the narrow gain margin let by the electrostatic filter, the low level of energy applied and the very short treatment time. (See J.A. Gallego-Juárez et al., Environmental Science and Technology Vo. 33, 1999, pp. 3843-3849)

Sludge filtration

One of the present requirements in sewage treatment is the dewatering of sludge. To that purpose, conventional filtration techniques are not satisfactory because the phenomenon of fouling or blocking the pores is frequently produced resulting in slow processing rates or in flux decline. As a consequence the residual moisture in the filter cake always remains high, and it is very difficult to remove. Power ultrasonics has shown to be effective in the release of the residual moisture. Ultrasonic energy directly coupled to the sludge by using the new plate generators causes the alternating stresses an effective deliquoring by creating channels for moisture migration. By the application of ultrasonic energy, dewatering higher than 80% can be obtained with a short treatment time (2 seconds) and a relatively low intensity applied (about 0.25W/cm2). (See J.A. Gallego-Juárez et al., Ultrasonics Vo.41, 2003,pp.255-259)

Ultrasonic Energy in Food Technology

The application of power ultrasound to food processing technology is one of the most promising fields for the future progress of ultrasound. The clean action of ultrasonic energy as a mechanical non-contaminant non-ionizing radiation plays a determinant role in the continuous search for finding safer and higher quality production methods. The new processes developed are: defoaming, drying and supercritical fluid extraction.

Defoaming

Foam is generally an unwanted by-product in industrial processes because it causes difficulties in process control and in equipment operation. A typical example is in the fermentation industry where foam represents one of the biggest problems. The most efficient conventional method for defoaming is the use of chemical anti-foaming agents but they contaminate the product. High-intensity ultrasonic waves represent a clean and efficient procedure to break foam bubbles. A new ultrasonic defoamer based on the use of the stepped-plate power generator has been developed. Such system has been successfully tested for the control of excess foam produced in fermenting vessels and in other reactors of great dimensions as well as on high-speed canning and bottling lines during the filling operation. (See J.A. Gallego-Juárez et al., Chapter 36, pp. 793-814, book “Power Ultrasonics”)

Drying

Drying is a method for preserving food. For food drying the two main conventional procedures are hot-air drying and freeze-drying. Hot air drying is a widely used method but it can produce deteriorative changes in the food. Instead, in freeze-drying, where food pieces are first frozen and then sublimates, the product quality is maintained but the process is expensive. High intensity ultrasonic waves can be used for drying food materials. On the basis of the new family of power ultrasonic generators, a new technology for food dehydration has been developed by using two experimental procedures: forced-air drying assisted by air-borne ultrasound and ultrasonic dehydration by applying ultrasound in direct contact with the material. Both techniques have shown to be effective and the quality of the food products was maintained with a low energy consumption.(See J.A. Gallego-Juárez et al., Drying Technology Vo. 25, 2007, pp. 1893-1901)

Supercritical fluid extraction

The use of supercritical fluids as extracting agents has been attracting wide interest for years and, in particular, supercritical carbon dioxide is considered nowadays as a very useful solvent in the extraction process because it is non-toxic, recyclable, cheap, relatively inert, and non-flammable. Nevertheless, the process has a slow dynamics.

The use of power ultrasound represents an efficient way for enhancing mass transfer processes by radiation pressure, microstreamings and agitation. This new technique has been successfully tested on vegetable oils extraction in a semi-industrial plant constituted by four high-pressure extraction vessels. The results obtained have shown that the kinetics and the extraction yield are enhanced in a range of 30% to 90%depending of the product. (See J.A. Gallego-Juárez and E. Riera, Chapter 25, pp. 617-642, book “Ultrasound Technologies for Food and Bioprocessing”, Springer, NY 2011)

Manufacturing Processes

The versatility of the ultrasonic energy allows it to be used in many different manufacturing processes usually as an additional tool to improve either the manufactured product or the process. Three different manufacturing processes have been developed: washing in textile manufacture, debubbling of liquid coating layers, pigment dispersion in paint manufacture

Washing in textile manufacture

Fabric processing in textile manufacturing is a wet processing to improve the appearance and serviceability of the fabric. It includes several operations that usually require washing the fabric. The use of ultrasonic energy in such operations speeds up the process and improves the quality of the final product. In this way a new ultrasonic washing machine has been developed and patented in which the textiles are exposed to the ultrasonic field in flat format and within a thin layer of liquid by applying specific plate transducers. Both process and device have been implemented at semi-industrial stage. (See J.A. Gallego-Juárez et al., Ultrasonics Sonochemistry Vo. 17, 2010, pp. 234-238)

Debubbling of liquid coating layers

Industrial coatings applied at high speed often contain bubbles from air entrapped during operation. Such bubbles will produce permanent surface defects after drying and, consequently, piece rejections in the production line. Chemical additives are generally used to alleviate the problem, but they are difficult to dose and, if not properly handled, can create problems which may be even worse than the air retention. High-intensity air-borne ultrasound represents an adequate contact-less method to break the bubbles. A new process has been developed based on the direct application of air-borne ultrasound to break the bubbles which are semi-submerged within the coating layer. The new procedure, which has been patented, represents an efficient approach for the quick debubbling of thin coating layers. (See J.A. Gallego-Juárez et al., Spanish Patent Application 200600619 and Ultrasonics Vo. 44, 2006, pp. e529-532)

Pigment dispersion in paint manufacture

Pigment dispersion is a critical factor in the manufacture of paint because it is a complicated and cost-intensive operation. Most of the paint properties are enhanced when the pigment particles are the smallest possible. The degree of pigment dispersion determines most of the essential properties of a paint. The application to this processing problem of a new technology based on power ultrasound offers a potential of innovation which is required in the paint industry .By using t rectangular-plate power ultrasonic generators, an ultrasound reactor to enhance pigment dispersion in paints, pastes and inks at industrial scale has been developed Trials performed with the prototype of ultrasound machine, sonicating with applied powers to the transducers in the range of 400W-600W and treating paint flows of 50 to 100 kg/h, proved the pigment disagglomeration effect and that better pigment dispersion can be obtained than with classical grinding machines.(Unpublished work)

Nonlinear Effects

In the investigation about nonlinear effects the main contributions can be summarized in the following studies: propagation of finite amplitude (spherical and plane) ultrasonic waves in air (J. Acoust. Soc. Am Vo 73, 1983, pp 761-767 and 768-773), finite amplitude longitudinal and flexural standing waves at ultrasonic frequencies in metallic bars (J. Acoust. Soc. Am. Vo. 97,1995, pp. 875-881, and Vo. 98, 1995, pp1742-1750) nonlinear effects in multiphase media (Acustica/Acta Acustica Vo. 86, 2000, pp. 784-797) and transient (inertial) cavitation in

gassy liquids (J. Acoust. Soc. Am. Vo. 101, 1997, pp.2536-2540). Among the various achievements the following are to be mentioned:

- Experimental determination of all the propagation regions of finite-amplitude waves and verification at ultrasonic frequencies of some theoretical models (weak shock theory for spherical waves and Rudnick model for plane waves)
- Development of theoretical models for finite-amplitude standing waves and experimental verification
- Development of a method for the determination of the nonlinearity parameter of solid materials
- Procedure to determine the ultrasonic fatigue limit of metallic materials
- Development of a model for nonlinear effects in the acoustic agglomeration of aerosol particles and experimental verification
- Detection of two different types of transient cavitation in a gassy liquid and the establishment of a new method to detect the inception of transient (inertial) cavitation.

RECENT PUBLICATIONS AND PATENTS (since 2000)

Papers in Journals

1. J. A. Gallego-Juárez, G. Rodríguez l, E. Riera, C. Campos Pozuelo, F. Vázquez Martínez, V.M Acosta
"A macrosonic system for industrial processing"
Ultrasonics Vol. 38 (2000) 331-336

2. I. Gonzalez, T.L. Hoffmann, J.A. Gallego-Juárez
"Theory and calculation of sound induced particle interactions of viscous origin"
Austica/Acta Acustica vol. 86, nº 5 (2000) pp 784-797

3. L. Elvira, G. Rodríguez, J. A. Gallego-Juárez
"Ultrasonic assisted deliquoring of fine particle sluries"
Acustica/Acta Acustica, Vol. 86 (2000) 179-180.

4. E. Riera, J. A. Gallego-Juárez, G. Rodríguez , L. Elvira, I.Gónzalez
"Application of high-power ultrasound to enhance fluid/solid particles separation processes"
Ultrasonics Vol. 38 (2000) 642-646.

5. E. Riera, J. A. Gallego-Juárez, G. Rodríguez, V. Acosta, J. J. Rodríguez Maroto, J. L. Dorronsoro, D. Sanz-Rivera, F. J. Gómez-Moreno y M. Martin Espigares
“Acoustic agglomeration of submicron particles in diesel exhausts: first results of the influence of humidity at two acoustic frequencies"
J. Aerosol Sci. Vol. 31 Suppl. 1, (2000), pp.S827-S828

6. I.Gonzalez, T.L. Hoffmann, J.A. Gallego-Juárez
“Precise measurement of particle acoustic entrainment between 20 and 3500 Hz”
Journal of Aerosol Science, 2000, vol. 31, nº 12 pp. 1461-1468

7. I. Gonzalez, J. A. Gallego-Juárez
“The absorption of sound in suspensions due to the acoustic wake effect”
Rivista Italiana di Acustica, Vol. 25 nº1-3/2001. p401.

8. I. Gonzalez, L. Elvira, T. Hoffmann, J. A. Gallego-Juarez
“Numerical Study fo the Hydrodynamic Interaction between Aerosol Particles Due to

the Acoustic Wake Effect"
Acustica/Acta Acustica, nº4, July/August 2001, pp. 437-530

9. I. Gonzalez, T. Hoffmann, J. A. Gallego-Juarez
"Visualization of hydrodyamic particle interaciton: validation of a numerical model"
Acustica/Acta Acustica, (2002) vol.88, nº1 pp. 19-26

10. A. Iula, F. Vazquez, M.Pappalardo, J.A. Gallego-Juárez
"Finite element three dimensional analysis of the vibrational behaviour of the Langevin-type transducer"
Ultrasonics, vol 40 (2002) pp.513-517

11. J. A. Gallego-Juárez, G. Rodríguez, E. Riera, F. Vázquez-, C. Campos-Pozuelo, V. M. Acosta.
"Recent developments in vibrating-plate macrosonic transducers"
Ultrasonics, vol 40 (2002) pp. 889-893

12. I-Gonzalez, J.A Gallego-Juarez
"Contribution of the acoustic wake effect to the attenuation of sound on dilute suspensions of rigid particles"
IEEE Transactions on Ultasonics, Ferroelectrics and Frequency Control, Marzo 2003, Vol 50, nº3, pp 334-338.

13. J. A. Gallego-Juárez, L. Elvira, G. Rodríguez,
"A power ultrasonic technology for deliquoring"
Ultrasonics, vol. 41 (2003) p. 255-259

14. I. Gonzalez, J. A. Gallego-Juárez, E. Riera
"The influence of entrainment on acoustically induced interactions between aerosol particles- an experimental study".
Aerosol Science 34, 2003, pp. 1611-1631.

15. E. Riera, Y. Golás, A. Blanco, J. A. Gallego-Juárez, M. Blasco, A. Mulet.
"Mass transfer enhancement in supercritical fluids extraction by means of power ultrasound."
Ultrasonics Sonochemistry, 11, 2004, pp. 241-242

16. C. Campos-Pozuelo, C. Vanhille, J.A. Gallego-Juárez
"Comparative Study of the Nonlinear Behavior of Fatigued and Intact Samples of Metallic Alloys"
IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control, January 2006, vol.53, nº1 (ISSN 0885-3010), pp 175-184

17. E. Riera, J. A. Gallego-Juárez, T. J. Mason
"Airborne ultrasound for the precipitation of smokes and powders and the destruction of foams"
Ultrasonics Sonochemistry 13 (2006) pp.107-116

18. D. Chacón, G. Rodriguez, L. Gaete, E. Riera, J. A. Gallego-Juárez
"A procedure for the efficient selection of piezoelectric ceramics constituting stacks in high-power ultrasonic sandwich transducers"
Ultrasonics 44, Dec. 2006, Supplement 1, e517-e521

19. S. de la Fuente, E. Riera, G. Rodríguez-Corral, J. A. Gallego-Juárez
"Ultrasonic system for drying process"
Ultrasonics 44, Dec. 2006, Supplement 1, e523-e527

20. I. Gonzalez, G. Rodriguez, I. Garmendia, J. A. Gallego-Juárez
"Application of high-intensity air-borne ultrasound for debbubling liquid films"
Ultrasonics 44, Dec. 2006, Supplement 1, e529-e532

21. J. A. Gallego-Juárez, E. Riera, S. de la Fuente, G. Rodriguez, V. M. Acosta, A. Blanco
"Application of high power ultrasound for dehydration of vegetables: processes and devices"
Drying Technology, 25, 2007, pp. 1893-1901.

22. J. A. Gallego-Juárez, G. Rodríguez, V.M. Acosta, E. Riera
"Power ultrasonic transducers with extensive radiators for industrial processing",
Ultrasonic Sonochemistry, vol 17 (6), 2010, 953-964

23. J. A. Gallego-Juárez, E. Riera, V. M. Acosta, G. Rodríguez, A. Pinto, A. Blanco
"Ultrasonic system for continuous washing of textiles in liquid layers"
Ultrasonics Sonochemistry 17 (2010), pp.234-238.

24. E. Riera, A. Blanco, J. García, J. Benedito, A. Mulet, J.A. Gallego-Juárez, M. Blasco
High-power ultrasonic system for the enhancement of mass transfer in supercritical CO2 extraction processes
Ultrasonics 50 (2010) 306-309.

25. H.T. Sabarez, J.A. Gallego-Juárez , E. Riera, "Ultrasonic assisted convective drying of apple slices", Drying Technology 30,9 (2012) 989-997

26. A. Cardoni, E. Riera, A. Blanco, V.M. Acosta, J.A. Gallego-Juárez, Modal interactions in ultrasonic plate-transducers for industrial applications", Journal of Mechanical Engineering Science 226 (2012) 2044-52

Books

1. J. A. Gallego-Juárez and K. F. Graff (Eds)
"Power Ultrasonics", WP-Elsevier, Cambridge UK, 2015 (ISBN 978-1-78242-0286).

2. C.Ranz and J.A. Gallego-Juárez (Eds)
"New Acoustics. Selected Topics", CSIC, Madrid 2002 (ISBN 84.00.08111-0)

Book Chapters

1. J.A. Gallego-Juarez
"Nonlinear Acoustics and industrial applications" in "Nonlinear Acoustics at the Turn of the Millenium", W. Lauterborn and T. Kurz (Eds), AIP, New York, 2000, pp. 45-54

2. J. A. Gallego-Juárez
"Crear silencio" en "Fotografiando las matemáticas",
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3. Campos-Pozuelo, C. Vanhille and J.A. Gallego-Juárez
Nonlinear elastic behaviour and ultrasonic fatigue of metals" (Chapter 28) in "The universality of nonclassical nonlinearity, with applications to NDE and Ultrasonics",
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5. J.A. Gallego-Juárez, E. Riera, V. M. Acosta-Aparicio
"Modal interactions in high-power ultrasonic processing transducers", p 595-604. in

"Nonlinear Acoustics Fundamentals and Applications". O. Enflo, C.M. Hedberg and L. Kari (Eds), AIP, New York. 2008

6. J.A Gallego-Juárez y E. Riera
"Technologies and applications of air-borne power ultrasound in food processing" Chapter 25, pp 617-642 in "Ultrasound Technologies for Food and Bioprocessing", H. Feng, G.V. Barbosa and J. Weiss (Eds), Springer, New York 2011

7. E. Riera, J.V. García-Perez, J.A. Carcel, V. M. Acosta and J.A. Gallego-Juárez
"A computational study of ultrasound assisted drying of food materials" Chapter 13, p265-301 in "Innovative Food Processing Technologies: Advances in Multiphysics Simulation" K. Knoerzer, P. Juliano, P. Roupas and C. Versteeg (Eds), Wiley&Blackwell, Oxford 2011.

8. J.A. Gallego-Juárez
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9. J .A. Gallego-Juárez
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10. J.A. Gallego-Juárez and K. F. Graff
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11. J.A. Gallego-Juárez, G. Rodriguez, V.M. Acosta-Aparicio, E.Riera and A. Cardoni.
"Power ultrasonic transducers with vibrating plate radiators" Chapter 7, pp. 159-193 in "Power Ultrasonics" J.A. Gallego-Juárez and K.F. Graff, (Eds), WP-Elsevier, Cambridge, UK 2015

12. J.A. Gallego-Juárez,
"Ultrasonic washing of textiles" Appendix to Chapter 19, pp 602-609 in "Power Ultrasonics" J.A. Gallego-Juárez and K.F. Graff, (Eds), WP-Elsevier, Cambridge, UK 2015

13. J.A. Gallego-Juárez, G. Rodriguez, E. Riera and A. Cardoni
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14. J. V. García-Pérez, J.A. Carcel, A. Mulet, E. Riera and J.A. Gallego-Juárez
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15. E. Riera, I. González-Gómez, G. Rodriguez and J.A. Gallego-Juárez
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4. E. Riera, J.A. Gallego-Juárez, F. Montoya, A. Blanco, A. Mulet, J. J. Benedito, R. Peña, Y. Golás, A. Berna, S. Subirats, M. Blasco, J. García -Reverter
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   (“Procedure for separation or extraction processes with supercritical fluids assisted by ultrasound”)
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   “Procedimiento y dispositivo para mejorar la transferencia de materia en procesos a baja temperatura mediante el uso de ultrasonidos de elevada intensidad”(“Procedure and device to improve mass transfer by means of the use of high-intensity ultrasound”)
   Spanish Patent, Application nº P201131512, Sept. 2011.

10. J. A. Carcel, J. V. García-, R. Peña, A. Mulet, E. Riera, V. M. Acosta, J. A. Gallego-Juárez.

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"New power ultrasonic technologies for environmental and industrial applications"
J. A. Gallego-Juárez
Plenary lecture

2. Ultrasonics International 2001, 2-5 July 2001, Delft, Paises Bajos.
"A power ultrasonic technology for deliquoring"
J. A. Gallego-Juárez, L. Elvira-Segura G. Rodríguez-Corral

3. Ultrasonics International 2001, 2-5 July 2001, Delft, Holland
"Recent developments in vibrating-plate macrosonic transducers"
J. A. Gallego-Juárez, G. Rodríguez-Corral, E. Riera-Franco de Sarabia, F. Vázquez-Martínez, C. Campos-Pozuelo, V. M. Acosta-Aparicio

4. World Congress on Ultrasonics /IEEE International Ultrasonic Symposium, Atlanta 6-10 October 2001
"Development of industrial models of high-power stepped-plate sonic and ultrasonic transducers for use in fluids."
J. A. Gallego-Juárez, G. Rodríguez-Corral, E. Riera-Franco de Sarabia, F. Vázquez-Martínez, V.M. Acosta-Aparicio, C. Campos-Pozuelo

5. 17th International Congress on Acoustics, Rome 2-7 Sept. 2001
"The absorption of sound in suspensions due to the acoustic wake effect"
I. Gonzalez-Gómez, J. A. Gallego-Juárez
Plenary lecture

6. Congrès Français d'Acoustique, Lille, April 2002
"New Industrial Applications of High-power ultrasound"
Plenary lecture
J. A. Gallego-Juárez

7. Forum Acusticum 2002, Sevilla, 16-20 Sept. 2002
"Macrosonics: Phenomena, transducers and applications"
J. A. Gallego Juárez
Plenary lecture

8. Forum Acusticum 2002, Sevilla, 16-20 Sept. 2002
"Application of high-power ultrasound for drying vegetables"
E. Riera-Franco de Sarabia, J.A. Gallego-Juárez, G. Rodríguez-Corral, V.M. Acosta-Aparicio, E. Andrés-Gallegos

9. Forum Acusticum 2002, Sevilla, 16-20 Sept. 2002
"Influence of the acoustic entrainment on aerosol particle interactions: experimental balance of the hydrodynamic mechanisms"
I. Gonzalez Gómez, J. A. Gallego Juárez , E. Riera Franco de Sarabia

10. Forum Acusticum 2002, Sevilla, 16-20 Sept. 2002
"Analysis of the nonlinear reverberation of titanium alloys fatigued at high amplitude ultrasonic vibration"
K. Van den Abeele, C. Campos Pozuelo, J. A. Gallego Juárez, F. Windels, B. Bollen

11. 1st Innovative Foods Centre Conference, 28-29 November 2002, Werribee, Australia
"Development of high-power ultrasonic technologies for food processing at the Instituto de Acústica"
J. A. Gallego Juárez
Plenary lecture

12. IV Jornadas Iberoamericanas, Santiago de Chile, Julio 2002
"Aplicaciones industriales de los ultrasonidos de potencia"
J. A. Gallego, G. Rodríguez

13. 9th Meeting of the European Society of Sonochemistry, Badajoz, 25-30 April 2004
"High-Power Ultrasonic Technologies for Food Processing"
J. A. Gallego-Juárez

14. Workshop on Ultrasound for textile applications, Povoa de Varzim, Portugal, 11-12 Nov. 2004.
"Interaction of high-intensity ultrasound with textile materials in water media"
J. A. Gallego-Juárez

15. 19th International Congress on Acoustics, 2-7 Sept 2007, Madrid.
"Acoustics for the 21st Century"
J.A. Gallego-Juárez
Opening plenary lecture

16. 19th International Congress on Acoustics, 2-7 Sept 2007, Madrid.
"Industrial requirements in high-power ultrasonic transducers for defoaming"
G. Rodriguez, V. M.;Acosta, A. Pinto, J. A. Gallego-Juárez

17. 19th International Congress on Acoustics, 2-7 Sept 2007, Madrid.
"Prototype for the use of ultrasound in supercritical media"
E. Riera, A. Blanco, V.M. Acosta, J.A. Gallego-Juárez, M. Blasco, A. Mulet.

18. 19th International Congress on Acoustics, 2-7 Sept 2007, Madrid.
"Non linear down-frequency conversion effects in high intensity vibration of plate transducers and piezoelectric structures"
Adriano Alippi, Andrea Bettucci, Angelo Biagioni, J. A. Gallego-Juárez,. Daniele Passeri, E. Riera'

19. "18th ISNA, Stockholm 7-10 July 2008
Modal interactions in high-power ultrasonic processing transducers",
J.A. Gallego-Juárez, E. Riera, V. M. Acosta-Aparicio
Plenary lecture

20. International Congress on Ultrasound, 11-17 January 2009, Santiago de Chile
"High-power ultrasonic processing: recent developments and prospective advances"
J. A. Gallego-Juárez
Plenary lecture

21. WSEAS International Conference-AMTA 09- Prague March 2009
"Macrosonics: Sound as a Source of Energy"
J. A. Gallego-Juárez
Plenary lecture

22. 40th Annual Symposium of Ultrasonics Industry Association, , University of Glasgow (UK), 23-25 May 2011 Glasgow
"Power industrial ultrasonics in fluid and multiphase media: processes and technologies"
Juan A. Gallego-Juárez
Plenary lecture

23. VIII Congreso Iberoamericano de Acústica, 1-3 Oct. Evora Portugal 2012.
Nuevos campos de aplicación de los ultrasonidos de potencia en procesos industriales y medio ambiente
Juan A. Gallego-Juárez

24. Forum Acusticum, 7-12 Sept. 2014, Krakow, Poland.
"Air coupled power ultrasound"
J. A. Gallego-Juárez, E. Riera

25. Forum Acusticum, 7-12 Sept. 2014, Krakow, Poland.
"New trends in air coupled power ultrasound applications"
E. Riera, V.M. Acosta, A. Blanco, J.A. Gallego-Juárez

26. Eurofoods 2015, 6-18 June, Alicante
"Ultrasonic energy in food technology: novel applications and devices"
Juan A. Gallego-Juárez
Plenary lecture

27. 13th International Conference on Electrical Engineering, Computing Science and Automatic Control(CCE), 26-30 Sept. 2016, Mexico City.
"Power ultrasonic technologies in biomedical and industrial engineering. Transfer from research to industry"
Juan A. Gallego-Juárez
Plenary lecture

OTHER INVITED LECTURES (since 2000)

1. "Algunos problemas no-lineales en Acústica"
Universidad Complutense de Madrid, Dpto Matemática Aplicada
Facultad de Ciencias Matemáticas, 3 Abril 2001.

2. "Ultrasonidos de Potencia: Fenómenos básicos, sistemas y procesos"
Investidura del Grado de Doctor Honoris Causa por la Universidad de Santiago de Chile, 31 Agosto, 2004

3. "El Consejo Superior de Investigaciones Científicas: pasado y presente"
Universidad Técnica de Dresden, Alemania, 8/06/2005.

4. "Development of high-power ultrasonic technologies for food and pharmaceutical processing"
Laboratories Fresenius-Kabi, Uppsala Sweden, 31 Agosto 2006

5. “High-power stepped-plate ultrasonic transducers for use in fluids and in multiphase media”
   Shaanxi Normal University, Xian, China, 26 Sept. 2006.

6. “Development of new high-power ultrasonic processes and applications”
   Shaanxi Normal University, Xian, China, 28 Sept. 2006.

7. “Factores de éxito en las tareas de I+D: relación entre investigadores y las grandes compañías”
   Ciencia y Tecnología para el Desarrollo y la Competitividad en la Minería, Santiago de Chile 2-5 Mayo 2006.

8. “Los ultrasonidos de Potencia y sus aplicaciones”
   Facultad de Ciencias Físicas, Universidad Complutense de Madrid.
   Ceremonia de Entrega de Premios Extraordinarios de Licenciatura y Doctorado, 12 Dic. 2006

9. “Power ultrasound and its various applications in airborne systems”
   Argonne National Laboratory, US Department of Energy, The University of Chicago, USA, 14 Abril 2011.

10. “Remediación de la contaminación atmosférica por partículas finas mediante aglomeración acústica”
    Escuela Técnica Superior de Ingenieros de Minas, Universidad Politécnica de Madrid, 20 Oct. 2011.

11. “Ultrasound”
    European Acoustical Association (EAA), Winter School 2013, Approaching Acoustics.
    Merano, Italy,15-17 March 2013

Madrid, January 2018