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### **A. Identifying Data**

#### **Butrus (Pierre) T. Khuri-Yakub**

Professor of Electrical Engineering, Stanford University

### **B. Academic History**

Ph.D.	Stanford University	1975
M.S.	Dartmouth College	1972
B.S.	American University of Beirut	1970

### **C. Employment Record**

1982 - present	Professor, Electrical Engineering Stanford University
1978 - 1982	Senior Research Associate Edward L. Ginzton Laboratory Stanford University
1975 - 1978	Research Associate Edward L. Ginzton Laboratory Stanford University

### **D. Awards and Honors**

2011	2011 IEEE Rayleigh Award
2011	Stanford Biodesign Certificate of Appreciation for commitment to educate, mentor and inspire Biodesign Fellows
2005	American University of Beirut Distinguished Alumnus
2004	Stanford University Outstanding Inventor
1999	Distinguished Lecturer of the IEEE Ultrasonics, Ferroelectrics and Frequency Control (UFFC) group
1987	Award for Distinguished Advisor, School of Engineering, Stanford University
1983	Award for Contributions to Nondestructive Testing, Medal of the City of Bordeaux

## **E. Teaching**

Undergraduate courses since 1988 (Excellent Tau Beta Pi scores)  
Graduate courses since 1990

## **F. University Service**

Deputy Director E. L. Ginzton laboratory since 1982  
Associate Chair for graduate admissions, Electrical Engineering department and other committees over time.

## **G. Professional Memberships and Affiliations**

Member, Scientific Council of Le Studium  
Fellow, Institute of Electrical and Electronic Engineering (IEEE)  
Senior Member, Acoustical Society of America  
Member, Tau Beta Pi  
Associate Editor, Research in Nondestructive Evaluation, *Journal of the American Society of Nondestructive Testing*  
Member of the Ad-Com, IEEE Group on Ultrasonics, Ferroelectrics and Frequency Control (1994-97)

## **H. Industrial Activities**

Founder, co-founder, scientific advisor to many companies.

## BIBLIOGRAPHICAL INFORMATION:

### Invited Papers

39. M. Kupnik and **B. T. Khuri-Yakub**. "Wafer-bonded CMUT meets CMOS - MEMS-based ultrasonic transducer arrays including electronics integration." *invited talk at CMOS Emerging Technology Workshop, Whistler, Canada*, (May, 2010).
38. M. Kupnik, I. Wygant, S. H. Wong, Y. Huang, **B. T. Khuri-Yakub**. "CMUT-based applications for gaseous media," *International Congress on Ultrasonics, Vienna, Austria*, (Apr., 2007).
37. **B. T. Khuri-Yakub**, "High-frequency ultrasound imaging using capacitive micromachined ultrasonic transducers," *AIUM Annual Convention, New York, NY*, (Mar., 2007).
36. **B. T. Khuri-Yakub**, K. K. Park, H. J. Lee, G. Yaralioglu, A. S. Ergun, Ö. Oralkan, M. Kupnik, C. F. Quate, T. Braun, H. Lang, M. Hegner, J. Ramsever, C. Gerber, and J. Gimzewski. "The capacitive micromachined ultrasonic transducer (CMUT) as a chem/bio sensor," *in Proc. IEEE Ultrasonic Symposium*, pp. 472-475, (2007).
35. A.F.W. van der Steen, R.A. Baldewsing, F.L. Degertekin, S. Emelianov, M.E. Frijlink, Y. Furukawa, D. Goertz, M. Karaman, **B.T. Khuri-Yakub**, K. Kim, F. Mastik, T. Moriya, Ö. Oralkan, Y. Saijo, J.A. Schaar, P.W. Serruys, S. Sethuraman, A. Tanaka, H.J. Vos, R. Witte, M. O'Donnell, "IVUS beyond the horizon," *EuroIntervention*, vol. 2, no. 1, pp. 132-142, (May 2006).
34. S. Vaithilingam, I. O. Wygant, P. S. Kuo, X. Zhuang, Ö. Oralkan, P. D. Olcott, and **B. T. Khuri-Yakub**, "Capacitive micromachined ultrasonic transducers (CMUTs) for photoacoustic imaging," *in Proc. SPIE Photons Plus Ultrasound: Imaging and Sensing 2005: The Sixth Conference on Biomedical Thermoacoustics, Optoacoustics, and Acousto-optics*, vol. 6086, pp. 1-11, (2006).
33. **B.T. Khuri-Yakub**, "Thin Film Capacitive Micromachined Ultrasonic Transducers," MS2005 Annual Meeting, San Francisco, CA, Feb. 13-17, 2005, [invited presentation].
32. G. Perçin, G. G. Yaralioglu, and **B. T. Khuri-Yakub**, "Micromachined Fluid Ejector Arrays for Biotechnological and Biomedical Applications," in 2003 IEEE ICRA: International Conference on Robotics and Automation, Taipei, Taiwan, (May 12-17, 2003) [Invited presentation].
31. A. S. Ergun, G. G. Yaralioglu, **B. T. Khuri-Yakub**, "Capacitive Micromachined Ultrasonic Transducers: Theory and Technology," *Jour. of Aerospace Eng.*, 16, 76-84 (Apr. 2003). [Invited Journal Paper]
30. **Butrus T. Khuri-Yakub**, Mustafa Karaman, Ching-Hsiang Cheng, Sanli Ergun, Goksenin Yaralioglu, Baris Bayram, Utkan Demirci, Sean Hansen, Mohammad Badi, and Omer Oralkan, "Micromachined Capacitor Ultrasonic Transducers," presented at the 10th US-Japan Seminar on Dielectric and Piezoelectric Ceramics, Providence, Rhode Island; in Program and Extended Abstracts of The 10th US-Japan Seminar on Dielectric and Piezoelectric Ceramics, pp.391-399, (Sept. 26-29, 2001) [Invited].
29. **B. T. Khuri-Yakub**, A. S. Ergun, C-H. Cheng, O. Oralkan, G. Percin, S. Hansen, M. Badi, and U. Demirci, "Microfabricated Ultrasonic Transducers: Past, Present, and Future," presented at the 1st International Workshop on Microfabricated Ultrasonic Transducers," Rome, Italy, (May 10-11, 2001) [Invited].

28. **B. T. Khuri-Yakub**, "Silicon Micromachined Ultrasonic Transducers for Bulk, Lamb, and Rayleigh Waves," presented at the Acoustical Society of America Meeting, Newport Beach, California, (Dec. 3-8, 2000) [Invited].
27. **B. T. Khuri-Yakub**, "Silicon Micromachined Ultrasonic Transducers," presented at Ultrasonics International '99 joint with 1999 World Congress on Ultrasonics, Copenhagen, Denmark, (Jun. 29 - Jul. 1, 1999) [Invited].
26. **B. T. Khuri-Yakub**, "Material Characterization using Micromachined Air Transducers," presented at the 137th Meeting of the Acoustical Society of America, Berlin, Germany, (Mar. 14-19, 1999) [Invited].
25. **B. T. Khuri-Yakub**, F. L. Degertekin, X.C. Jin, S. Calmes, I. Ladabaum, S. Hansen, and X. J. Zhang, "Silicon Micromachined Ultrasonic Transducers," presented at the IEEE Ultrasonics Symposium, Sendai, Japan (Oct. 5-8, 1998); in *1999 Ultrasonics Symposium Proceedings*, S. C. Schneider, M. Levy, and B. R. McAvoy, eds. (Institute of Electrical and Electronics Engineers, Inc., New York, pp. 985-991, (1999). [Invited].
24. **B. T. Khuri-Yakub**, "Silicon Micromachined Ultrasonic Transducers," presented at the 16th International Congress on Acoustics and 135th Meeting Acoustical Society of America, Seattle, Washington, (Jun. 20-26, 1998) [Invited].
23. **B. T. Khuri-Yakub**, "Novel Ultrasonics Sensors and Actuators in the Microelectronics Industry," presented at Ultrasonics International '97, Delft, The Netherlands, (Jul. 2-4, 1997) [Invited].
22. K. C. Saraswat, Y. Chen, and **B. T. Khuri-Yakub**, "Modeling, Measurement and Control of Rapid Thermal Processing," presented at 1996 TMS (The Mineral, Metals and Materials Society) Annual Meeting, Anaheim, California (Feb. 4-8, 1996); in *Transient Thermal Processing Techniques in Electronic Materials*, N. M. Ravindra and R. K. Singh, eds., pp. 3-10 [Invited].
21. K. C. Saraswat, Y. Chen, L. Degertekin, and **B. T. Khuri-Yakub**, "A New Flexible Rapid Thermal Processing System," presented at the Symposium on Rapid Thermal and Integrated Processing IV, San Francisco, California (Apr. 17-20, 1995); in *MRS Symposium Proceedings on Rapid Thermal and Integrated Processing IV*, vol. 387, Steven R. J. Brueck, Jeffrey C. Gelpey, Ahmad Kermani, Jorgé L. Regolini, and James C. Sturm, eds. (MRS, Pittsburgh, Pennsylvania, 1995), pp. 35-47 [Invited].
20. F. Levent Degertekin and **B. T. Khuri-Yakub**, "NDE of Composites by Dry Contact Transducers," ICCE/2 Conference, New Orleans, Louisiana, (1995) [Invited].
19. K. Saraswat, **B. T. Khuri-Yakub**, P. P. Apte, L. Booth, Y. H. Chen, P. Dankoski, L. Degertekin, G. Franklin, M. M. Moslehi, C. Schaper, P. Gyugyi, Y. J. Lee and J. Pei, "Rapid Thermal Multiprocessing for Adaptable Manufacturing of ICs," *IEEE Transactions on Semiconductor Manufacturing - Special Issue on Microelectronics Manufacturing Science and Technology (MMST) 1993* [Invited].
18. B. Hadimioglu, S. A. Elrod, D. L. Steinmetz, M. Lim, J. C. Zesch, **B. T. Khuri-Yakub**, E. G. Rawson, and C. F. Quate, "Acoustic Ink Printing," presented at the IEEE Ultrasonics Symposium, Tucson, Arizona (Oct. 20-23, 1992); in *1992 Ultrasonics Symposium Proceedings*, B. R. McAvoy, ed. (Institute of Electrical and Electronics Engineers, Inc., New York, 1992), pp. 929-935 [Invited].
17. **B. T. Khuri-Yakub**, C-H. Chou, and P. Parent, "Amplitude and Phase Acoustic Microscopy for the Inspection of Ceramic Bearing Balls," presented at the Fourth Course of the International School on Physical Acoustics, Acoustic Sensing and Probing, Erice, Italy, (Oct. 3-10, 1991); in *Acoustic Sensing and Probing*, A. Alippi, ed. (World Scientific Publishing, New Jersey, 1992), pp. 97-114 [Invited].

16. **B. T. Khuri-Yakub**, S. Akamine, B. Hadimioglu, H. Yamada, and C. F. Quate, "Near Field Acoustic Microscopy," presented at SPIE Symposium on Scanning Microscopy Instrumentation, San Diego, California (Jul. 21-26, 1991); in *SPIE Proceedings on Scanning Microscopy Instrumentation*, vol. 1556 (SPIE, Washington, 1992), pp. 30-39 [Invited].
15. **B. T. Khuri-Yakub**, "Application of Acoustic Microscopy to Electronic Packaging Problems," presented at the 3rd Electronic and Materials Processing Conference, San Francisco, California (Aug. 20-24, 1990); in *New Technology in Electronic Packaging, Proceedings of ASM International's 3rd Electronic Materials and Processing Congress*, B. R. Livesay and M. D. Nagarkar, eds. (ASM International, Materials Park, Ohio), pp. 311-315 [Invited].
14. **B. T. Khuri-Yakub**, K. C. Saraswat, Y. J. Lee, and S. Bhardwaj, "Photoacoustic Techniques for Thin Film Thickness and Temperature Measurements in Semiconductor Processing," Presented at the Workshop on Tungsten and other Advanced Metals, Dallas, Texas (Jun. 1990) [Invited].
13. K. C. Saraswat, L. Booth, D. D. Grossman, **B. T. Khuri-Yakub**, Y. J. Lee, M. M. Moslehi, and S. Wood, "Rapid Thermal Multiprocessing for Micro Factories," presented at SPIE Symposium on Rapid Isothermal Processing, Santa Clara, California (Oct. 12-13, 1989); in *SPIE Proceedings on Rapid Isothermal Processing*, vol. 1189 (SPIE, Washington, 1989), pp. 2-14 [Invited].
12. J. F. Vesecky, D. Fernandez, C. C. Teague, **B. T. Khuri-Yakub**, and C. Cinbis, "Inferring Ocean Microlayer Properties from Acoustic Measurements of Capillary Waves," presented at the American Geophysical Union/ASLO Meeting, San Francisco, California (Dec. 5-9, 1988) [Invited].
11. **B. T. Khuri-Yakub**, C. Cinbis, P. Parent, J. F. Vesecky, and C. C. Teague, "Ultrasonic and Optical Measurement of Capillary Waves for Machine Microlayer Characterization," presented at the American Geophysical Union/ASLO Meeting, San Francisco, California (Dec. 5-9, 1988) [Invited].
10. S. A. Elrod, B. Hadimioglu, **B. T. Khuri-Yakub**, E. G. Rawson, C. F. Quate, N. N. Mansour, and T. S. Lundgren, "Nozzleless Droplet Formation with Focused Acoustic Beams," presented at the 3rd International Colloquium on Drops and Bubbles, Monterey, California (Sept. 18-21, 1988); in *AIP Conference Proceedings*, vol. 197, Taylor G. Wang, ed. (American Institute of Physics, New York, 1988), pp. 49-57 [Invited].
9. **B. T. Khuri-Yakub**, "Acoustic Microscope," presented at the Alcoa Laboratories Centennial Technical Symposia 1986-1988, Nemacon Woodlands, Pennsylvania (Jun. 13-17, 1988) [Invited].
8. **B. T. Khuri-Yakub**, "Acoustic Microscopy," presented at O/E Laser '88, Los Angeles, California (Jan. 13-15, 1988), in *SPIE Proceedings on Scanning Microscopy Technologies and Applications*, vol. 897 (SPIE, Washington, 1988), pp. 118-128 [Invited].
7. G. S. Kino, J. Fanton, and **B. T. Khuri-Yakub**, "Optical Measurements of Acoustic and Photoacoustic Effects," presented at the IEEE Ultrasonics Symposium, Williamsburg, Virginia (Nov. 17-19, 1986); in *1986 Ultrasonics Symposium Proceedings*, B. R. McAvoy, ed. (Institute of Electrical and Electronics Engineers, Inc., New York, 1986), pp. 505-514 [Invited].
6. **B. T. Khuri-Yakub**, "Acoustic Microscopy of Structural Materials," presented at Micro 86, The Biennial Conference of the Royal Microscopical Society, London, England (Jul. 7-11, 1986); in *Royal Microscopical Society Proceedings*, vol. 21 (Royal Microscopical Society, Oxford, England, 1986), pp. S9-S10 [Invited].

5. G. S. Kino, **B. T. Khuri-Yakub**, J. D. Fox, R. L. Jungerman, P. C. D. Hobbs, K. K. Liang, and R. G. Stearns, "Scanned Microscopy Techniques," presented at the 14th International Symposium on Acoustical Imaging, The Hague, The Netherlands (Apr. 22-25, 1985); in *Acoustical Imaging*, vol. 14 (Plenum Press, New York, 1985), pp. 221-236 [Invited].
4. **B. T. Khuri-Yakub**, "Detection and Sizing of Fatigue Cracks by Ultrasonic and Optical Methods," presented at the Fifth International Conference on Nondestructive Testing Methods, Bordeaux, France (May 30 - Jun. 3, 1983); in *Proceedings of the 3rd International Conference on Nondestructive Testing Methods*, 129-134 (Edition Sacer, France, 1983), pp. 129-134 [Invited].
3. J. E. Bowers, R. L. Jungerman, and **B. T. Khuri-Yakub**, "Noncontacting Sensors for Acoustic Waves," presented at the IEEE Ultrasonics Symposium, San Diego, California (Oct. 27-29, 1982); in *1982 Ultrasonics Symposium Proceedings*, B. R. McAvoy, ed. (Institute of Electrical and Electronics Engineers, Inc., New York, 1982), p. 854-860 [Invited].
2. **B. T. Khuri-Yakub**, "Acoustic Characterization of Structural Ceramics," presented at the Conference on Advances in Materials Characterization, Alfred, New York (Aug. 1982); in *Materials Science Research*, vol. 15, David R. Rossington, Robert A. Condrate, and Robert L. Snyder, eds. (Plenum Press, New York, 1983), pp. 401-412 [Invited].
1. **B. T. Khuri-Yakub**, "Nondestructive Evaluation of Structural Ceramic Components," presented at the IEEE Ultrasonics Symposium, New Orleans, Louisiana (Sept. 26-28, 1979); in *1979 Ultrasonics Symposium Proceedings*, J. deKlerk and B. R. McAvoy, Eds. (Institute of Electrical and Electronics Engineers, Inc., New York, 1979), pp. 309-320 [Invited].

## Referred Journal Articles

183. D. S. Lin, R. Wodnicki, X. Zhang, C. Woychik, K. E. Thomenius, R. A. Fisher, D. M. Mills, A. J. Byun, W. Burdick, **P. Khuri-Yakub**, B. Bonitz, T. Davies, G. Thomas, B. Otto, M. Topper, T. Fritzsche, and O. Ehrmann, "Packaging and Modular Assembly of Large-Area and Fine-Pitch 2-D Ultrasonic Transducer Arrays," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 60, no. 7, pp. 1356-1375, July 2013.
182. J.W. Choe, A. Nikoozadeh, O. Oralkan, and **B. T. Khuri-Yakub**, "GPU-Based Real-Time Volumetric Ultrasound Image Reconstruction for a Ring Array," *Mechanical Imaging, IEEE Transactions on*, vol. 32, no. 7, pp 1258-1264, July 2013.
181. A. Kamaya, S. Vaithilingam, B. I. Chung, O. Oralkan, and **B. T. Khuri-Yakub**, "Photoacoustic Imaging of the Bladder," *J. Ultrasound Med*, vol 32, pp. 1245-1250, Jul. 2013.
180. K. K. Park, O. Oralkan, and **B. T. Khuri-Yakub**, "A Comparison Between Conventional and Collapse-Mode Capacitive Micromachined Ultrasonic Transducers in 10-MHz 1-D Arrays," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 60, no. 6, pp 1245-1255, June 2013.
179. K. K. Park, and **B. T. Khuri-Yakub**, "3-D airborne ultrasound synthetic aperture imaging based on capacitive micromachined ultrasonic transducers," *Ultrasonics*, vol 53, pp 1355-1362, Apr 2013.
178. M. D. Menz, O. Oralkan, **P. T. Khuri-Yakub**, and S. A. Baccus, "Precise Neural Stimulation in the Retina Using Focused Ultrasound," *J. Neuroscience*, vol. 33, no. 10, pp 4550-4560, Mar 2013.
177. H. J. Lee, K. K. Park, M. Kupnik, and **B. T. Khuri-Yakub**, "Functionalization layers for CO<sub>2</sub> sensing using capacitive micromachined ultrasonic transducers," *Sensors and Actuators B: Chemical*, vol. 174, pp. 87-93, (Nov. 2012).
176. K. K. Park, and **B. T. Khuri-Yakub**, "Dynamic response of an array of flexural plates in acoustic medium," *J. Acoust. Soc. Am.*, Vol. 132, Issue 4, pp. 2292-2303, (Aug. 2012).
175. J. W. Choe, O. Oralkan, A. Nikoozadeh, M. Gencel, D. N. Stephens, M. O'Donnell, D. J. Sahn, and **B. T. Khuri-Yakub**, "Volumetric Real-Time Imaging Using a CMUT Ring Array," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 59, no. 6, pp. 1201-1211, (Jun. 2012).
174. H. J. Lee, K. K. Park, M. Kupnik, N. A. Melosh, and B. T. Khuri-Yakub, "Mesoporous Thin-film on Highly-Sensitive Resonant Chemical Sensor for Relative Humidity and CO<sub>2</sub> Detection," *Analytical Chemistry*, vol. 84, no. 7, pp. 3063-3066, (Feb. 2012).
173. A. F. Sarioglu, M. Kupnik, S. Vaithilingam, and **B. T. Khuri-Yakub**, "Nanoscale Topography of Thermally-Grown Oxide Films at Right-Angled Convex corners of Silicon," *J. Electrochemical Soc.*, vol. 159, no. 2, pp. H79-H84, (2012).

172. D. N. Stephens, U. T. Truong, A. Nikoozadeh, O. Oralkan, C. H. Seo, J. Cannata, A. Dentinger, K. Thomenlus, Al. de la Rama, T. Nguyen, F. Lin, **P. Khuri-Yakub**, A. Mahajan, K. Shivkumar, M. O'Donnell, and D. J. Sah, "First in Vivo Use of a Capacitive Micromachined Ultrasound Transducer Array-Based Imaging and Ablation Catheter," *Ultrasound Med.*, vol. 31, pp. 247-256, (2012).
171. K. K. Park, H. Lee, M. Kupnik, Ö. Oralkan, J.-P. Ramseyer, H. P. Langc, M. Hegner, C. Gerber, **B. T. Khuri-Yakub**. "Capacitive micromachined ultrasonic transducer (CMUT) as a chemical sensor for DMMP detection," *Sensors and Actuators B: Chemical*, vol. 20, no. 1, pp. 1120-1127, (Dec. 2011).
170. H. J. Lee, K. K. Park, M. Kupnik, Ö. Oralkan, and **B. T. Khuri-Yakub**. "Chemical Vapor Detection Using a Capacitive Micromachined Ultrasonic Transducer," *Analytical Chemistry*, (Nov. 2011).
169. C. H. Seo, D. N. Stephens, J. Cannata, A. Dentinger, F. Lin, S. Park, D. Wildes, K. E. Thomenius, P. Chen, T. Nguyen, A. de la Rama, J. S. Jeong, A. Mahajan, K. Shivkumar, A. Nikoozadeh, O. Oralkan, U. Truong, D. J. Sahn, **P. T. Khuri-Yakub**, M. O'Donnell, "The Feasibility of Using Thermal Strain Imaging to Regulate Energy Delivery During Intracardiac Radio-Frequency Ablation," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 58, no. 7, pp. 1406-16, (Jul. 2011).
168. **B.T. Khuri-Yakub** and O. Oralkan, "Capacitive micromachined ultrasonic transducers for medical imaging and therapy," *Micromechanics and Microengineering*, vol. 21, no. 5, pp. 54004-15, (Apr. 2011).
167. K. K. Park, H. Lee, M. Kupnik, and **B.T. Khuri-Yakub**, "Fabrication of capacitive micromachined ultrasonic transducers via local oxidation and direct wafer bonding," *Microelectromechanical Systems, Journal of*, vol. 20, no. 2, pp. 95-103, (Feb. 2011).
166. J. Levi, S.R. Kothapalli, T. J. Ma, K. Hartman, **B.T. Khuri-Yakub**, and S. S. Gambhir, "Design, Synthesis, and Imaging of an Activatable Photoacoustic Probe," *American Chemical Society, Journal of*, vol. 132, no.32, pp. 112644-11269, (Jul. 2010).
165. A. de la Zerda, Z. Liu, S. Bodapati, R. Teed, S. Vaithilingam, **B. T. Khuri-Yakub**, X. Chen, H. Dai, and S. S. Gambhir, "Ultrahigh Sensitivity Carbon Nanotube Agents for Photoacoustic Molecular Imaging in Living Mice," *Nano Letters*, vol. 10, no.6, pp. 2168-2172, (Jun. 2010).
164. A. de la Zerda, Y. M. Paulus, R. Teed, S. Bodapati, Y. Dollberg, **B. T. Khuri-Yakub**, M. S. Blumenkranz, D. M. Moshfeghi, and S. S. Gamghir, "Photoacoustic ocular imaging," *Optics Letters*, vol. 35, no.3, pp. 270-272, (Feb. 2010).
163. S. H. Wong, M. Kupnik, R.D. Watkins, K. B. Pauly, and **B.T. Khuri-Yakub**, "Capacitive Micromachined Ultrasonic Transducers for Therapeutic Ultrasound Applications", *Biomedical Engineering, IEEE Transactions on*, vol. 57, no.1, pp. 114-123, (Jan. 2010).
162. D. S. Lin, X. Zhuang, S. H. Wong, M. Kupnik, and **B.T. Khuri-Yakub**, "Encapsulation of capacitive micromachined ultrasonic transducers using viscoelastic polymer," *Microelectromechanical Systems, Journal of*, vol. 19, no. 6, pp. 1141-1351, (Dec. 2010).
161. S. Vaithilingam, T.J. Ma, Y. Furukawa, I. O. Wygant, X. Zhuang, A. de la Zerda, Ö. Oralkan, A. Kamaya, S. S. Gambhir, R. B. Jeffrey Jr., and **B.T. Khuri-Yakub**, "Three-dimensional photoacoustic imaging using a two-dimensional CMUT array," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 56, no. 11, pp. 2411-19, (Nov. 2009).
160. I. O. Wygant, N. Jamal, H. J. Lee, A. Nikoozadeh, O. Oralkan, M. Karaman and **B. T. Khuri-Yakub**, "An Integrated Circuit With Transmit Beamforming Flip-Chip Bonded to a 2-D CMUT Array for 3-D Ultrasound Imaging," *IEEE Ultrasonics, FerroElectrics, and Frequency Control*, Vol. 56 Number 10, pp. 2145-2156, (Oct. 2009).



159. M. Karaman, I. O. Wygant, Ö. Oralkan, and **B. T. Khuri-Yakub**, "Minimally redundant 2-D array designs for 3-D medical ultrasound imaging," *Medical Imaging, IEEE Transactions on*, vol. 28, no. 7, pp. 1051-1061, (Jul. 2009).
158. **B. T. Khuri-Yakub**, Ö. Oralkan, and M. Kupnik, "Next-gen ultrasound," *IEEE Spectrum*, vol. 46, no. 5, pp. 44-54, (May 2009).
157. D. N. Stephens, M. O'Donnell, K. Thomenius, A. Dentinger, D. Wildes, P. Chen, K. K. Shung, J. Cannata, **P. Khuri-Yakub**, Ö. Oralkan, A. Mahajan, K. Shivkumar, and D. J. Sahn, "Experimental studies with a 9F forward-looking intracardiac imaging and ablation catheter," *Journal of Ultrasound in Medicine*, vol. 28, no. 2, pp. 207-215, (Feb. 2009).
156. Y. Huang, X. Zhuang, E. O. Hæggstrom, A. S. Ergun, C.-H. Cheng, and **B. T. Khuri-Yakub**, "Capacitive micromachined ultrasonic transducers with piston-shaped membranes: Fabrication and experimental characterization," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 56, no. 1, pp. 136-145, (Jan. 2009).
155. X. Zhuang, I. O. Wygant, D. Lin, M. Kupnik, Ö. Oralkan, and **B. T. Khuri-Yakub**, "Wafer-bonded 2-D CMUT arrays incorporating through-wafer trench-isolated interconnects with a supporting frame," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 56, no. 1, pp. 182-192, (Jan. 2009).
154. I. O. Wygant, M. Kupnik, J. C. Windsor, W. M. Wright, M. S. Wochner, G. G. Yaralioglu, M. F. Hamilton, and **B. T. Khuri-Yakub**, "50 kHz Capacitive micromachined ultrasonic transducers for generation of highly directional sound with parametric arrays," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 56, no. 1, pp. 193-203, (Jan. 2009).
153. A. Nikoozadeh, I. O. Wygant, D. Lin, Ö. Oralkan, A. S. Ergun, D. N. Stephens, K. E. Thomenius, A. M. Dentinger, D. Wildes, G. Akopyan, K. Shivkumar, A. Mahajan, D. J. Sahn, and **B. T. Khuri-Yakub**, "Forward-looking intracardiac ultrasound imaging using a 1-D CMUT array integrated with custom front-end electronics," *Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on*, vol. 55, no. 12, pp. 2651-2660, (Dec. 2008).
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