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IEEE Sensors Council

IEEE Sensors Council of Richland Chapter

Presents a technical talk on

"The Physics of Cataract Surgery"

Presented by

Leonard J. Bond

Professor Emeritus
Iowa State University

December 10th, 12:00 Noon to 1:00 PM

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Abstract

Despite its unparalleled success and the common the use of phacoemulsification in the field of ophthalmic surgery, the precise mechanism of ultrasonic phacoemulsification for cataract extraction remains controversial. The web and literature report various mechanisms that are said to occur, and some myths, which have been discussed for decades. This talk will report various ultrasonic measurements and the results of an investigation of the interaction of ultrasonic tools with materials and the mechanisms that can be seen to occur. The results show that phacoemulsification is most likely dominated by the direct action of the vibrating tip of the tool used against tissue. The source of the "cavitational hiss," that has been reported, is clearly identified. The insights given will, hopefully, reduce some of the mystery and mythology that still surrounds the physics of the fundamental interactions, for what is generally a safe and effective procedure for cataract removal.

Speaker Bio: Dr. Bond graduated with his Ph.D. in Physics, in 1978, from the City University London. He has experience as an academic, in industry and national laboratories. Most recently he was a Professor at Iowa State University in both Aerospace and Mechanical Engineering. He retired in 2022 and continues to be active in research as a consultant, including with Sonogen Medical Inc. His previous positions include being a Laboratory Fellow with Pacific Northwest National Laboratory (PNNL), a Research Professor, University of Colorado, Boulder and Reader in Ultrasonics, University College London. He is an Honorary Professor Beijing, University of Technology. He is author of the 4th Edition of the book – Ultrasonics (2024), D. Ensminger and L.J. Bond, CRC/Taylor and Francis