



# The 9<sup>th</sup> Annual World Congress of Advanced Materials–2023



May 08-10, 2023



Shinagawa Prince Hotel, Tokyo, Japan



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Ms. Elsa Wang



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## **Title: Totally Implantable Fiber-Optic Sensing System (TIFOS) - A Step Toward Totally Implantable Hearing Aids (TIHA)**

*Dr. Zoran Djinovic\*, Robert Pavelka, Milos Tomic and Georg Sprinzl*

Laboratory Head/Project Manager

ACMIT GmbH

Austria

### ***Abstract***

Currently, more than 1.5 billion people (nearly 20% of the world population) are living with hearing loss. By 2050, nearly 2.5 billion people are projected to have some degree of hearing loss and at least 700 million will require hearing rehabilitation. While conventional hearing aids greatly improve the lives of people with hearing difficulties, they cause problems by being worn externally (e.g. stigma, bathing). We present here an innovative implantable hearing aid microphone that, when combined with a cochlear implant, could represent a fully internal hearing aid. To achieve an internal microphone, our technology utilizes a novel fiber-optic approach. The fiber-optic sensor is a kind of an optical vibrometer aimed to be used as a totally implantable fiber-optic microphone for hearing aids. The sensor is invisible as it is placed inside the human middle ear and is capable to detect the amplitude of the incus vibrations over the range of few picometers to a couple of nanometers, which corresponds to an SPL of about 35 to 90 dB. The basic operation principle is high-coherence fiber-optic interferometry. Online signal processing allows permanent conversion of the acoustical into an electrical signal over the audio frequency range from 100 Hz to 8 kHz in real time.

### ***Biography***

Zoran Djinovic received doctoral degree in 1990 from the University of Belgrade in field of vapor phase epitaxy of II-VI compounds aimed to development of infrared detectors. He was a Principal Researcher at the Institute of Chemistry, Technology and Metallurgy, University of Belgrade where he became a Full Researcher Professor in 2012. In 2002 he moved to the Vienna University of Technology at the Institute of Sensors and Actuators as a Researcher Fellow in field of Micro-electromechanical Systems (MEMS) and Fiber-optic sensing technology. Since 2012 he is within Austrian Center for Medical Innovation and Technology (ACMIT) acting as a Head of Fiber-optic laboratory. Currently, his research interest is focused on development of fiber-optic sensors for medical and industrial application, including Structural Health Monitoring.