



## Protein Electrodynamics & Terahertz Medicine: New Paradigms for Covid-19 and Medicine

It is well known that proteins exhibit dynamic behavior with their normal modes specifically vibrating at terahertz frequencies. These motions are essential to protein function and because these macromolecules are charged the existence of such vibrations suggest the possibility of specific interaction with electromagnetic radiation in the terahertz band. Time-domain spectroscopic experiments were performed identifying specific absorption of terahertz radiation (~0.8THz and 1.3THz) by methemoglobin as well as potential interactions between high frequency and low frequency modes (e.g. Stokes shift). This proof-of-concept result suggests that these protein spectroscopic signatures can serve as the basis of a novel form of molecular medical imaging; likewise terahertz-modulated manipulation of such motions may underlie new forms of therapy. This seminar will provide an overview of this rapidly advancing field including some of the key medical applications of such technologies. Collaborative studies now underway, including THz imaging of cancer and Alzheimer's disease tissues will also be highlighted. Applications to novel approaches to diagnosing, preventing and treating viral infections, including that of Covid-19 will also be addressed.

### OGAN GUREL, MD

Dr. Ogan Gurel serves as Chief Medical Officer for **Psomagen USA** (a division of MacroGen) and holds academic appointments as a Visiting Professor at the **Solbridge International School of Business** and Visiting Teaching Professor at **DGIST (Daegu Gyeongbuk Institute of Science & Technology)**, with previous DGIST positions as Vice-Chair & Distinguished Invited Professor in the Management of Innovation. In the innovation world, Dr. Gurel is also Chief Scientific Officer for **FRT – Field Robot Technology**, Chief Marketing Officer for **Eidware / SoundMind** (Seoul), Advisor for the **CREST-Malaysia Digital Health Cluster** and a Venture Partner at **The Yozma Group**, with previous executive roles as CEO at **NovumWaves** (Seoul), Acting Chief Medical Officer at **Nessa Hearing** (Singapore), and Advisor at **Frasen** (Seoul). Ogan served over four years as a Director in the CTO office (MOT & Open Innovation groups) at the **Samsung Advanced Institute of Technology (SAIT)**. Dr. Gurel's over 35 years of experience spans multiple sectors: biomedical science, clinical medicine, strategy consulting, marketing, business development, executive management, marketing, and R&D management, with domain expertise in medical devices, digital healthcare, healthcare IT, molecular biophysics, and medical imaging. Prior to surgical training at the **Massachusetts General Hospital**, he obtained an MD degree *Alpha Omega Alpha* from **Columbia University**, also doing graduate work in structural biology (M.Phil degree) and earned a Bachelor's in Biochemical Sciences *cum laude* from **Harvard College**, where he did his senior thesis work in molecular dynamics of DNA with Martin Karplus (Nobel Prize 2013) and Michael Weiss. Authoring 14 peer-reviewed scholarly papers, presenting nearly 200 conference proceedings and co-inventor on ten patent applications (four granted), Dr. Gurel has also given keynote addresses and other speeches at business and scientific conferences and seminars worldwide.