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Title:THz medical imaging: In vivo hydration sensing

Authors:Taylor, Zachary D. (1); Singh, Rahul S. (1); Bennett, David B. (2); Tewari, Priyamvada (1); Kealey, Colin P. (1); Bajwa, Neha (1); Culjat, Martin O. (1); Stojadinovic, Alexander (6); Lee, Hua (7); Hubschman, Jean-Pierre (5); Brown, Elliott R. (8); Grundfest, Warren S. (1)

Author affiliation:(1) Department of Bioengineering, University of California at Los Angeles, Los Angeles, CA 90095, United States; (2) Center for Advanced Surgical and Interventional Technology (CASIT), University of California at Los Angeles, Los Angeles, CA 90095, United States; (3) Department of Electrical Engineering, University of California at Los Angeles, Los Angeles, CA 90095, United States; (4) Department of Surgery, University of California at Los Angeles, Los Angeles, Los Angeles, Los Angeles, CA 90095, United States; (5) Department of Ophthalmology, University of California at Los Angeles, Los Angeles, Los Angeles, Los Angeles, Los Angeles, CA 90095, United States; (5) Department of Ophthalmology, University of California at Los Angeles, Los Angeles, CA 90095, United States; (6) Department of Surgery, Walter Reed Army Medical Center, Combat Wound Initiative Program, Washington, DC 20307, United States; (7) Department of Electrical and Computer Engineering, University of California at Santa Barbara, Santa Barbara, CA 93106, United States; (8) Department of Physics, Wright State University, Dayton, OH 45435, United States

Corresponding author: Taylor, Z.D. (zdeis@seas.ucla.edu)

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Abstract: The application of THz to medical imaging is experiencing a surge in both interest and federal funding. A brief overview of the field is provided along with promising and emerging applications and ongoing research. THz imaging phenomenology is discussed and tradeoffs are identified. A THz medical imaging system, operating at ∼ 525 GHz center frequency with ∼125 GHz of response normalized bandwidth is introduced and details regarding principles of operation are provided. Two promising medical applications of THz imaging are presented: skin burns and cornea. For burns, images of second degree, partial thickness burns were obtained in rat models in vivo over an 8 hour period. These images clearly show the formation and progression of edema in and around the burn wound area. For cornea, experimental data measuring the hydration of ex vivo porcine cornea under drying is presented demonstrating utility in ophthalmologic applications.

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