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Sheng-Jen (Tony) Hsieh
Joseph N. Zalameda
Editors

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Introduction

The SPIE ThermoSense conference promotes the worldwide exchange of information about Infrared (IR) imaging technology research and applications. Relevant technology areas include: thermography, thermal infrared sensing, IR imaging, measuring instruments, and non-destructive testing methods.

ThermoSense XXXVII built upon previous successful conferences and included emerging topics in sessions on *NDT and Signal Processing*, *Biological and Medical Applications*, and *Infrared Detectors and System Development*. Following are brief summaries of each session.

- Aerospace Applications: This session focused on the characterization of materials and components applied in aircraft industry using hybrid thermography, ultrasound, and/or optical imaging techniques. Topics included: coating, composites evaluation, and panel fatigue growth assessment.

- Building Materials and Infrastructure Applications: These sessions focused on characterization of building materials and structures using thermography and analytic modeling methods such as Finite Element Analysis (FEA). Approaches utilized included lock-in, pulse-phase, and modulated frequency thermography. Types of defects investigated include flaw size, crack depth, bubbles, and pin-holes. Materials and structures studied included building concrete, storage racks, optical film, and acrylic glass.

- Detector and Sensory System Development: This session focused on fabrication of detectors including: infrared fiber, logarithmic InGaAs, x-ray scintillator, and indium-antimony nanowires. Topics included a state-of-the-art review of infrared fiber (invited paper), infrared system integration with detectors, and computational approach to enhancing thermal imaging.

- NDT and Signal Processing: This session consisted of four invited papers: *Pulsed thermal NDT in tables, figures, and formulas* [9485-26]; *Advances in thermographic signal reconstruction* [9485-27]; *Principal component analysis for thermal image analysis* [9485-28]; and *Review of thermographic signal reconstruction* [9485-29].

- NDT and Materials Evaluation: These sessions focused on materials evaluation utilizing hybrid non-destructive testing methods including laser ultrasound, thermal wave, C-scan, and microscope imaging. Materials of

interest included carbon fiber, photonic hetero-structure, mild steel, and nuclear graphite.

- Manufacturing and Processing Industries: This session focused on welding processes, including spot-welding and laser beam welding process characterization.

- Detection of Gas and Leaks: Detection of gas and leaks is an important problem for public safety and national security. The oil and gas and chemical industries have very strict guidelines on gas release. Topics presented included combustion reaction, water spray transmission, gas and flame detection, seal contamination of packaged food, and micro-fluid system activation. Both multispectral and mid-wave infrared imaging techniques were applied.

- Biological/Medical Applications: This new session focused on applications of thermography in areas related to biology and medicine. Topics included a presentation of a 3D medical thermography device, applications of infrared imaging for mass screening, and use of thermography to track human body temperature.

The conference drew participants from many countries including: Spain, Portugal, Austria, Italy, Germany, Greece, France, Belgium, Ireland, Russia, Columbia, Chile, Belgium, Finland, Australia, Kazakhstan, Taiwan, Japan, Canada, and United States. This year, we had 46 papers and 52 presentations.

We would like to thank the authors, vendors, session chairs, ThermoSense steering committee, and SPIE technical staff who made this conference a success. Finally, we would like to acknowledge the support of Jay James, Vice President for Sales at FLIR Systems, Inc., for donating a FLIR ONE personal thermal imager as the Best Paper prize.

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