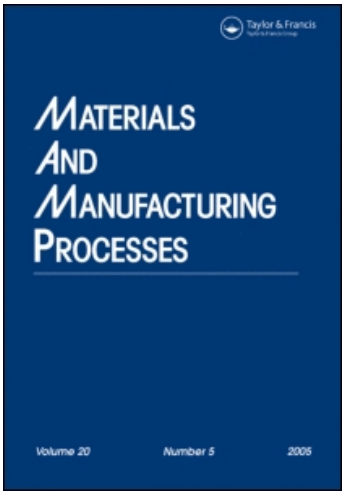

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Preface: Special Issue of *Materials and Manufacturing Processes*: "Sensors, Actuators, and Intelligent Processing"

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Preface: Special Issue of *Materials and Manufacturing Processes*: "Sensors, Actuators, and Intelligent Processing"

Recent development of smart materials and structures has opened a new page in the materials science and engineering discipline. The use of embedded as well as surface mounted sensors and/or actuators can provide structural information of structures subjected to different kinds of stress generated by mechanically-induced, thermally-induced, and/or inherent-residual loadings. Some of these damages, located inside the structures, cannot be visually-inspected till a catastrophic failure occurs. In advanced composite structures, delamination normally is the most severe damage in all types of their applications. The new design of Airbus A380 and Boeing 787 have substantially used composite materials, both carbon and glass fiber types for their primary and secondary structures, delamination of the structures due to foreign object impacts, and thermally-induced internal cracks may cause the degradation of their structural performance. By using such tiny sensors, embedded inside the structures, we can measure the structural response in real time.

Thermography, vibration-control and measuring devices, and embedded fiber-optic sensors have been employed to measure the health condition of composite structures. Due to the size of the sensors, they would not induce any adverse effect to the structures. Some damages can also be assessed by using piezoelectric transducers with incorporated embedded sensors to measure the sound wave propagation characteristics to identify the type and location of damages.

All aforementioned nondestructive evaluation techniques require the need of in-depth understanding of the signal characteristics in relation to the type and severity of damages. Wave transmitted responses through different types of composites, such as glass fiber reinforced plastics, carbon fiber reinforced plastics, cementitious materials, and hybrid composites, may vary due to different properties of these materials. In this special issue, all contributors have focused on different aspects of sensors, actuators, and intelligent processing to address the need and importance of new technologies for identifying damages and measuring the structural performance of different kinds of structures.

Sensor technology

Fabrication and Characterization of Microscale Sensors for Strain Measurement in Flexible Polymer Heart Valve Leaflet.

Smart Pressure Sensing Mats with Embedded Hetero-Core Fiber Optic Nerve Sensors.

Fiber Bragg Gratings Array for Structural Health Monitoring.

Impact Response of a Wind Turbine Blade Measured by Distributed FBG Sensors.

Actuator technology

Design, Characterization, and Analysis of a Miniaturized Piezoelectric Transducer.

Strain Transfer Models for Macrofiber-Composite Strain Actuators.

Parallel and Individual Interrogations of Piezo-Impedance Transducers for Damage Detection.

Intelligent structures

Nonlinear Acoustic Nondestructive Evaluation (NDE): Qualitative and Quantitative Effects.

Guided Wave Damage Detection in Composite Plates under Temperature Variations.

Crack Growth Characteristics Evaluation Method in Ceramics Based on the Double-Torsion Technique.

A Shape Memory Alloy Energy Absorber for Backpack Design.

Characterization of Wave Propagation in Thin Laminated Plates.

Optimal Design of Smart Laminated Composite Structures.

Microstructure and Mechanical Properties of 0.63C-12.7Cr Martensitic Stainless Steel during Various Tempering Treatments.

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