



LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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DEPARTMENT OF MECHANICAL ENGINEERING

Report on “Smart Materials and its applications”

Event	: Guest Lecture
Title of Event	: Smart Materials and its applications
Date of the Event Organized	: 05-10-2017
Resource Person	: Dr.A.Arockia Rajan
Venue	: LBRCE, Mylavaram
No. of Participants	: Faculty: 22 Students: 226

Report on Event:

Dr.A.Arockia Rajan delivered a guest lecture on 05-10-2017 on “**Smart Materials and its applications**” to the students of II, III and IV yr students of Mechanical Engineering and III yr students of Aerospace Engineering.

The resource person defined the Smart materials as intelligent or responsive materials, are designed materials that have one or more properties that can be significantly changed in a controlled fashion by external stimuli, such as stress, temperature, moisture, pH, electric or magnetic fields, light, or chemical compounds. Smart Materials are the basis of many applications, including sensors and actuators, or artificial muscles, particularly as electrically activated polymers.

Smart materials have properties that react to changes in their environment. This means that one of their properties can be changed by an external condition, such as temperature, light, pressure, electricity, voltage, pH, or chemical compounds. This change is reversible and can be repeated many times. There is a wide range of different smart materials. Each offer different properties that can be changed. Some materials are very good indeed and cover a huge range of the scales.

The guest lecture briefed about

- **Piezoelectric materials** are materials that produce a voltage when stress is applied.
- **Shape-memory alloys and shape-memory polymers** are materials in which large deformation can be induced and recovered through temperature changes or stress changes (pseudoelasticity). The shape memory effect results due to respectively martensitic phase change and induced elasticity at higher temperatures.
- **Photovoltaic materials or optoelectronics** convert light to electrical current.
- **electroactive polymers** (EAP's) change their volume by voltage or electric fields
- **Magnetostrictive materials** exhibit a change in shape under the influence of magnetic field and also exhibit a change in their magnetization under the influence of mechanical stress.
- **Magnetic shape memory alloys** are materials that change their shape in response to a significant change in the magnetic field.

- **Smart inorganic polymers** showing tunable and responsive properties.
- **pH-sensitive polymers** are materials that change in volume when the pH of the surrounding medium changes.
- **Temperature-responsive polymers** are materials which undergo changes upon temperature.
- **Halochromic materials** are commonly used materials that change their color as a result of changing acidity. One suggested application is for paints that can change color to indicate corrosion in the metal underneath them.
- **Chromogenic systems** change color in response to electrical, optical or thermal changes. These include electrochromic materials, which change their colour or opacity on the application of a voltage (e.g., liquid crystal displays), thermochromic materials change in colour depending on their temperature, and photochromic materials, which change colour in response to light—for example, light-sensitive sunglasses that darken when exposed to bright sunlight.
- **Ferrofluid**
- **Photomechanical materials** change shape under exposure to light.
- **Polycaprolactone (polymorph)** can be molded by immersion in hot water.
- **Self-healing materials** have the intrinsic ability to repair damage due to normal usage, thus expanding the material's lifetime.
- **Dielectric elastomers (DEs)** are smart material systems which produce large strains (up to 500%) under the influence of an external electric field.
- **Magnetocaloric materials** are compounds that undergo a reversible change in temperature upon exposure to a changing magnetic field.
- **Thermoelectric materials** are used to build devices that convert temperature differences into electricity and vice versa.
- **Chemoresponsive Materials** change size or volume under the influence of external chemical or biological compound.

Photo Gallery:

