

# **VISVESVARAYA TECHNOLOGICAL UNIVERSITY BELGAUM**



## **Project Report on**

### **“Synthesis and Characterization of Nano Gold”**

Submitted in partial fulfillment of the requirements for the award of

Bachelor of engineering

in

**MECHANICAL ENGINEERING**

Submitted by

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**Academic year: 2011 - 2012**

## ABSTRACT

Nanomaterials are at the leading edge of the rapidly developing field of nanotechnology. Their unique size-dependent properties make these materials superior and indispensable in many areas of human activity. This brief review tries to summarize the most recent developments in the field of applied nanomaterials, in particular their application in biology and medicine, and discusses their commercialization prospects.

There are a number of curious aspects to catalysis by gold that are currently attracting research investigation, while observation of those gold based catalysts are active at room temperature and below it have considerable industrial aspect. Gold Ultra-fine particles with diameters smaller than 5 nm if deposited on selected metal oxides. It exhibits surprisingly high activities and selectively in the combustion of CO and saturated hydrocarbons. The explanation may be that the activity of Gold as catalyst is determined only by the availability of surface gold atoms with coordination numbers. In this case, the role of oxide support and of gold particle size and structure is in direct and they would serve mainly to modulate specific surface area of the gold.

The project work has been carried out in 3 stages:

### **I. In stage 1 of the project work:**

- Nano alumina has been successfully prepared by using commercially available aluminium-wire by sol-gel method.
- Nano gold has been successfully prepared by reducing chloroauric acid with tri sodium citrate dihydrate. Pink nano gold has been produced.
- Nano gold has been successfully prepared by reducing chloroauric acid with tri sodium citrate dihydrate and urea. Blue nano gold has been produced.

**II. In stage 2 of the project work:**

- Nano gold and nano alumina composite have been successfully prepared by using nano-alumina powder and nano gold (either pink/blue gold).
- Composite of blue nano gold and colloidal silica have been produced by using these two constituents and drying these at very low temperature.

**III. In stage 3 of the project work**

- Nano gold has been characterized by UV-visible absorption spectrophotometer.
- Nano alumina has been characterized in Scanning Electron Microscopy (SEM), EDX (Energy Dispersive and X-ray Analysis), Transmission Electron Microscopy (TEM), Selected Area Diffraction for morphology (particle shape) and qualitative composition.
- Characterizations of pink nano gold and nano alumina composite have been successfully carried out to reveal particle size, shape and qualitative chemical analysis by EDAX.