DEPARTMENT OF PHYSICS
SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES
CENTRAL UNIVERSITY OF KERALA
(Established under the Central Universities Act 2009)
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Minutes of the Meeting: PG Board of Studies

29.07.2016

Members Present:

1. Professor K J Thomas (Chairman)
2. Professor P. Kolandaivel, Bharathiar University
3. Dr. Alok Sharan, Pondicherry University
4. Dr. Vincent Mathews
5. Vijay Shenoy, IISc, Bangalore (on Skype)

The meeting began at 11.00 AM on 29.07.2016 in the office of the Dean, SPS. The members of the board have discussed and deliberated on the content of the Programme Structure. After the deliberations, the Board of Studies has suggested some modifications to the existing syllabus. The modified programme structure is approved and enclosed herewith.

The programme structure with the modified syllabus will be in force for students admitted in 2016-17 academic year onwards.

Professor P. Kolandaivel

Dr. Alok Sharan

Dr. Vincent Mathew

Professor K J Thomas

## PHY5010 Synthesis of Materials

| Course Code | PHY5010 | Semester | |
|---|---|---|---|
| Course Title | *Synthesis of Materials* | | |
| Credits | 3 | Type | Elective |

### Course Outcome

This is a skill based course in which students will be given basic understanding of sample synthesis through wet chemistry routes as well as physical depositions methods. Virtual demonstration is provided based on animations and videos. Basic properties are also discussed

### Course Structure

**Contents:** (1) Vacuum techniques, pumps and gauges. Experimental techniques. (2) Cryogenic techniques. Liquefaction of gases, various methods. Maintenance of low temperatures. Adiabatic demagnetization. Measurement of low temperatures. (3) Thin film techniques: properties, fabrication, thermal evaporation, sputter deposition, thickness measurements quartz crystal monitor, optical interference method, energy loss method, thin film optics. (4) Growth of materials: Bulk powder synthesis, Synthesis of one dimension, two dimensional and three dimensional structures. Molecular assembly, ordered structures. Photonic band gap structures, Meta-materials. Nanoscale architecture. (Physical and chemical methods)

### Suggested Books

1. S. Dushman, and J.L.Laffer, Scientific foundations of vacuum techniques, Wiley (1962)
2. K. L. Chopra, Thin film phenomena, Mc Graw Hill (1979)
3. Meissel and Glang, Hand book of thin film technology, McGraw Hill (1970)
4. L. Jackson, Low Temperature Physics, Wiley (1955)
5. F. Din and A. H. Cocker, Low Temperature Techniques, Wiley (1960)