Part 1 - General Information

Project Title: Synthesis, growth, characterisation and low temperature Raman studies of nonlinear optical crystals for UV generation

Keywords: Crystal growth, non linear optical studies, Raman studies, UV generation

Start date: January 10, 2010

Duration: 1 month

Part 2 - Exchange Participant(s) Details

VISITING SCIENTIST

Prof. Krishnakumar Varatharajan
Dept. of Physics
Periyar University
636 011 - Salem, INDIA
Email: vkrishna_kumar@yahoo.com

HOSTING SCIENTIST

Dr. Hans Hagemann
Dept. of Physical Chemistry
University of Geneva
1211 Geneva 4, SWITZERLAND
Email: hans-rudolf.hagemann@unige.ch
Part 3 - Scientific & Technical Information

3.1 Purpose of visit

To carry out low temperature Raman measurements in different crystallographic orientations for the organic nonlinear optical single crystals. In addition to that low temperature EPR studies for rare earth intermetallic compounds in single crystal form which orders magnetically at very low temperatures.

3.2 Short description of work carried out during the visit

During my visit to University of Geneva under this programme, I could understand the properties of nonlinear optical crystals and rare earth intermetallic compounds at extreme conditions of temperature. Also the low temperature Raman and Electron spin Resonance spectroscopic (EPR) measurements have been done by me for the first time. The experimental procedure, sample preparation, orientation of the crystals for measurements and loading procedures and the method of achieving low temperature have been learnt from my collaborator. Single crystal X-ray diffraction data have been collected for some samples. Further emission and absorption measurements have also been carried out in the host institute during my stay there.

3.3 Outcomes

We have measured EPR for a series of samples based on RCu₂Ga₂ systems but in that, only GdCu₂Ga₂ showed a good response and the results are interesting. The Raman spectra recorded under different polarisation geometries for Hydroxyethylammonium L-tartarate monohydrate and 2,4 dinitrophenol organic NLO crystals showed some significant interesting results. Single crystal X-ray diffraction data collected for Hydroxyethylammonium L-tartarate monohydrate crystal as well as for Ce₂Rh₅Ga₈ by synchrotron radiation facility. Further measurements and scientific analysis for the present results based on the plots and literature survey are underway. Soon it will be consolidated.

3.4 Future collaboration with host institution

The facilities available with the host institute will be utilised in future for our research by my group and the useful scientific discussions will be carried out.

3.5 Various comments

The instrumentation facilities in the host Department in University of Geneva are excellent and I had the opportunity of using them effectively. Net connectivity and the scientific data base are given access to me and are working well. We have not been able to obtain Raman spectra of the intermetallic compounds due to imperfections on the crystal surfaces which generate more straylight than signal. In general, the crystal quality is vital to obtain good spectroscopic results.
3.6 Projected publications/articles resulting or to result from the exchange

Two abstracts were submitted to International conference on Raman Spectroscopy (ICORS 2010) and it has been accepted for poster presentation.

The results obtained for various samples mentioned above are under discussion and in another couple of months one or two papers may be submitted to reputed journals.