

**Aquitaine –Karnataka collaboration  
Scientific Project for Pre-PhD student exchange**

**Scientific Proposal**

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| Project Title   | Understanding the electronic and optical properties of organic-inorganic hybrid perovskites.  |                       |
| Scientific domain   | Physical Chemistry and Materials science  |                       |
| Summary<br>(ca. 10 lines)                                     | Organic-inorganic hybrid perovskites have revolutionised the field of photovoltaics, with solar cell efficiency shooting over 20%. With the organic cation in the inorganic cage of lead and halide, these perovskites show very unique electronic and optical properties. These perovskites usually show structural phase transitions and exist in cubic/ tetragonal / orthorhombic phase at various temperatures. The bandgap of methylammonium lead iodide is nearly 1.5 eV and shows a large absorption coefficient. In this project, we shall synthesise bulk and thin films of a variety of such organic-inorganic perovskites and measure their absorbance, luminescence and dielectric properties which are necessary to understand their unique properties and high efficiency in solar cells. |                       |
| Student profile wished  | Understanding of Physics/Chemistry/Physical chemistry   |                       |
| Supervisor Name   | D. D. Sarma   |                       |
| Supervisor @<br>& phone                                       | sarma@sscu.iisc.ernet.in  | Tel: +91-80-22932945  |
| Institute/laboratory/industry<br>(full address)               | Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore 560012.   |                       |
| Director Name<br>Institute/laboratory/industry                | Anurag Kumar, Director, Indian Institute of Science   |                       |
| Director<br>Institute/laboratory/industry<br>@ & phone        | diroff@admin.iisc.ernet.in  | Tel: +91-80 2293 2222 |
| Timing & duration for<br>project (give approximate<br>ranges) | 3-6 months anytime.   |                       |
| Representative References                                     | <ol style="list-style-type: none"> <li>1. Snaith. H. J. , <i>J. Phys. Chem. Lett.</i> <b>4</b>, 3623 (2013).</li> <li>2. Baikie. T et al, <i>J. Mater. Chem.</i> <b>A1</b>, 5628 (2013).</li> <li>3. Stoumpos et al., <i>Inorg. Chem.</i> <b>52</b>, 9019 (2013).</li> <li>4. Lee et al, <i>Science</i> <b>338</b>, 643 (2012).</li> </ol>  |                       |

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| Contact Aquitaine:<br>Erick Dufourc<br>@: e.dufourc@cbmn.u-bordeaux.fr<br>tél: +33 5 4000 6818  | Contact Karnataka:<br>Dipankar das Sarma<br>@: sarma@sscu.iisc.ernet.in<br>tél: +91 80 2293 2945 |
| <a href="http://www.cbmn.u-bordeaux.fr/aquitaine-karnataka-exchange?lang=2">http://www.cbmn.u-bordeaux.fr/aquitaine-karnataka-exchange?lang=2</a> |  |