Malaviya National Institute of Technology Jaipur
Department of Physics

Advertisement for Project Staff (JRF/Project Fellow)

Applications are invited from Indian Nationals for the purely contractual project position as per the details given below for the research project under the Principal Investigator Dr. Manoj Kumar, Department of Physics, Malaviya National Institute of Technology Jaipur.

1. **Title of the Project:** Tuning the Properties of Topological Insulators by Ion Implantation
2. **Sponsor of the project:** Inter University Accelerator Centre (IUAC), New Delhi
3. **Project position(s) and number:** JRF/Project Fellow (one only)
4. **Qualifications:** M. Sc. in Physics or in relevant disciplines with minimum 60 % marks or CGPA 6.75 (on 10-point scale)
5. **Emoluments:** Rs. 25000/- per month for candidates with NET/GATE and Rs. 14000/- per month for candidates without NET/GATE (As per the norms of the funding agency)
6. **Duration:** One year (likely to be extended further up to 1 year)
7. **Job description:** Experimental research work. Candidates having experience with nanomaterials, Ion implantation, high pressure and low temperature studies would be given preference.
8. **Project description:** Topological Insulators (TIs), recently discovered exotic quantum materials, have seen a surge in research highlights because of their insulating bulk and conducting surface states (SS) protected by time reversal symmetry (TRS). These conducting SS have numerous applications in the field of quantum computing, spintronics and future low power electronics. However, controlling or manipulating SS is imperative for the real-world applications (*Nature Nanotechnology 6, 216 (2011), Reviews of Modern Physics 82, 3045 (2010)*). Introducing magnetic dopants in these materials is an effective method to control these SS as it breaks the TRS locally (Nature Nanotechnology 6, 216 (2011)). Understanding the 'habitat' of the dopants is very important to modify the SS. Bi_2Te_3, Bi_2Se_3 and Sb_2Te_3 are layered 3D TI materials hence the dopants can get introduced at different sites like octahedral or tetrahedral sites and/or in the Van der Waal gaps. The position of transition metal (TM) dopants is a crucial factor in manipulating the SS. For example, Cu doped Bi_2Se_3 can be superconducting when Cu is in the van der Waal gaps, while it is normal conducting material when it occupies other sites (Physical Review B 90, 094107 (2014)). Moreover, oxidation state of TM dopants at specific sites plays another important role for the modification of SSs, as the magnetic moment directly depends on oxidation state. Magnetically doped TIs have attracted great attention since the magnetic dopants can alter the SS and can host elusive and exotic particles of fundamental importance like magnetic monopoles (Science 323,1184 (2009)) and Quantum Anomalous Hall effect (Nature Physics 3053,1(2014)). Interestingly, ferromagnetic TIs are supposed to induce electronic junctions between the TIs with considerable chemical and structural compatibility. The study of such junctions is imperative for understanding the novel topological effects and to design ultrafast future electronic devices (Journal of Applied Physics 109,07E312 (2011)). The proposed studies will encourage a re-evaluation of the assumptions made for the oxidation state of transition metal dopants in TIs. To understand the mechanism of the magnetism in TI, the information about locations and local structures of the TM dopants is extremely important since it can significantly affect the physical properties. In this project, ion implantation of Ni, Fe & Cu ions by varying the energy into bismuth chalcogenide films will be carried out systematically.

The candidates who are interested to apply may submit their application at "Apply here" link **by 20th January 2020**. You will be required to upload detailed CV (Name/Date of Birth/Category/ Education Qualification/Master project/Work experience/Publication details (if any)/Address with email and mobile no. etc.). Copies of all the Certificates/Marksheets must be uploaded in a single pdf file.

Apply here! **(Before 20.01.2020)**

Candidates may also note the following:

a) MNIT Jaipur reserves the right to fix suitable criteria for short-listing of eligible candidates satisfying advertised qualification and requirements of the project post.
b) The committee also reserves right for not selecting any candidate/offering lower post in case candidates are not found suitable for the applied post.
c) Only shortlisted candidates will be informed for the interview by e-mail/Mobile and no separate interview letter will be issued for the same.
d) Candidates should appear for the interview at their own cost along with their original certificates. No TA/DA is admissible for attending the interview.
e) The selected candidates can opt for PhD program announced by MNIT in case they are interested in pursuing PhD at MNIT as per provision in the above work area.

For any further information, the applicants may contact PI by email.

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