



School of Nano Science



IPM Condensed Matter &  
Statistical Physics Group

## Weekly Seminar

### Plastic electronics and its traps

Invited speaker:

***Dr. Davood Abbaszadeh***

*Department of Physics, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan*

**Abstract:** Beside the big advantages of molecular electronic, presence of trapping states in these materials is considered as one of the big dilemmas in the field. Because these trap states that lie in forbidden band gap that is detriment for current flow, and they waste power. Electron trapping is a well-recognized issue in organic semiconductors, in particular in conjugated polymers, leading to a significant electron mobility reduction in materials with electron affinities smaller than 4 eV. Many researchers are trying to figure out that what is the origin of these traps and how to overcome this issue. Space-charge limited current measurements in diodes indicate that these traps have similar molecular origin, while calculations show that hydrated molecular oxygen is a plausible molecular candidate, with the tail of the solid-state electron affinity distribution reaching values as high as 4 eV. We, recently, proposed a method to dilute and eliminate traps that is based on their statistical distribution in the material. By mixing a conjugated polymers in an insulating polymer matrix, one can dilute trap density and hence eliminate their effect on electron mobility. Trap dilution not only improves transport but also reduces trap-assisted recombination, boosting the efficiency of polymer light emitting diodes. This talk, also will have a short review on 2 recent major works that one proposes a trap free window for conjugated semiconductors and the other proposes a new method on how one can get rid of these traps by dry-annealing the material while it is contradictory with preceding works in some parts.

**Wednesday, 1 Aban 1398 (October 23, 2019), 14:00-15:00**

**Seminar Room (Classroom A), Farmanieh Building, IPM**