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Homework 2
ECE 624
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1. Explain why electronic doping by introduction of suitable donor/acceptor levels in an amorphous material is difficult.
   - [1] concentration of defect states in the gap is higher than those introduced by doping
   - [2] Such low-coordination structure is so flexible
   - [3] VAPS make chalc glasses immune to doping because the Fermi is pinned
     - doping induces structural relaxation
     - free carriers that would be generated from dopants are now trapped
     - resistivity remains high (VAP)
2. Explain why the doping discussed in problem 1 might not improve carrier mobility.
   - [4] trapping at negative defect centers likely limits hole drift mobility
3. Would you expect to see blocking contacts in a metal-amorphous semiconductor contact? Explain your answer.
4. Describe the structural order giving rise to extended (delocalized) states and localized states in an amorphous semiconductor.
5. Provide definitions/explanations of the following:
   - Hubbard correlation energy
   - Localization length
   - Anderson transition
   - Localized "in the Anderson sense"
6. (a) What is the difference between variable range hopping and nearest neighbor hopping?
   (b) In which type of conduction will tunneling occur?

References

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