2.4.4 Organic Semiconductors

- This is were the action is - in **2007**. **Organic semiconductors** are hot topics in **R&D**, and first products in the form of **OLED**'s are on the market. **RFID**'s may or may not follow soon.
  - Materials Science and technology for organic conductors and semiconductors is far from being well understood and there are major technological challenges, too. To give just one example: Oxygen, quite ***ubiquitous*** in air, is deadly for organic semiconductor devices. How can you keep a (cheap) device absolutely airtight for **20** years or so?
- But first things first: What exactly are organic semiconductors?
  - There is no simple answer. Essentially you need two ingredients: Some organic molecule with a **conjugated** carbon-carbon chain. This means that there is a succession of "single bond - double bond", i.e. **–C=C–C=C–C=C–C=C–** with all kinds of stuff on the one remaining free valence of any **C** atom. There also must be some "doping" because the conjugated backbone chain of the polymer molecule is (surprisingly?!) not conductive or semi-conductive.
  - **Doping** is written in quotation marks because it has nothing to do with what we have learned about doping in **Si** - except that you add some impurities to your semiconductor.
- We will come back to this topic later (if there is time). Meanwhile you may activate the folllwing links:
  - Basics about semiconducting polymers
  - The Peierls instability: Why conjugated C-chains are *not* conductive - contrary to expectation!