

### 2.4.3 CuInSe<sub>2</sub> and other Chalcogenides

- There are a lot of "Chalcogenides", meaning compounds with "Chalcogens", i.e. **S**, **Se**, and **Te** as major elements (**O**, in the same **IIa** group, forms "oxides").
- The general recipe is to form a **IB - IIIA - VI** compound. In [group IB](#) we have essentially **Cu**, **Ag**, **Au**; in [group IIIA](#) we find **B**, **Al**, **Ga**, **In**.
  - That allows us, for example, to produce **CuInS<sub>2</sub>** or **CuInSe<sub>2</sub>** ("**CIS**"), but also **Cu<sub>3</sub>In<sub>5</sub>Se<sub>9</sub>**, **Cu<sub>2</sub>In<sub>4</sub>Se<sub>7</sub>** - look up the [link](#) for many more.
  - [Like before](#), we can "mix", e.g. produce **CuIn<sub>x</sub>Ga<sub>1-x</sub>S<sub>y</sub>Se<sub>2-y</sub>** and so on. In case of doubt we call the whole family "**CIGS**".
  - It certainly looks like there is plenty of work left for *you*, but "**CIS**" or "**CIGS**" solar cells are actually on the market.
  - Moreover, there are "simple" chalcogenides like **CdTe**, which are on the market for solar cells but not even contained in the long list in the link from above.
- We obviously have a big success story here. We will look at some of this later in more detail.