UNIVERSITÄT SIEGEN
FESTKÖRPERPHYSIK

3. Homework 3D-lattice, 3D-lattice planes, crystal morphology

1. Calculate the reciprocal basis vectors {**a*, b*, c***} and draw reciprocal lattices for the following real lattices:

a) a = b = c = 3.56 Å, α=β=γ=90 deg (***Diamond***)
b) a=7.42 Å, b=5.73 Å, c=10.01 Å, α=β=γ=90 deg (***Potassium Sulphate***)
c) a=b=4.9 Å, c=5.4 Å α=β=90 deg, γ=120 deg ***(α-Quartz***)

2. Find the d_{hkl} interplanar distances between the lattice planes
($d_{hkl}= \frac{1}{|\boldsymbol{G}_{hkl}|}$, $\boldsymbol{G}_{hkl}$ is a reciprocal lattice vector)
having following Miller indices in Diamond und α-Quartz crystal (see exercise 1):

a) (100)
b) (120)
c) (112)

3. Calculate the angles between given two crystal planes

($\cos(\alpha) = \frac{\boldsymbol{G}_{h1k1l1} \circ \boldsymbol{G}_{h2k2l2}}{|\boldsymbol{G}_{h1k1l1}| \cdot |\boldsymbol{G}_{h2k2l2}|}$)

for Diamond and α-Quartz crystals:

a) (100) and (010)
b) (100) and (101)
c) (101) and (011)