FIZIKA DANAS

Otvoreni dan Fizičkog odsjeka

5. travnja 2019.

Kako tražimo nove materijale?

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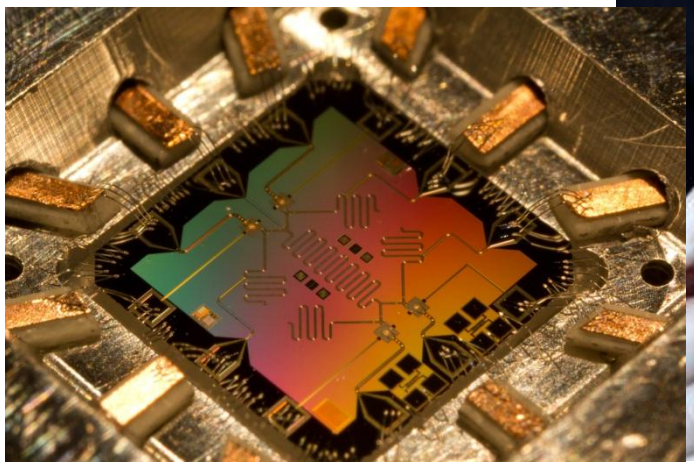
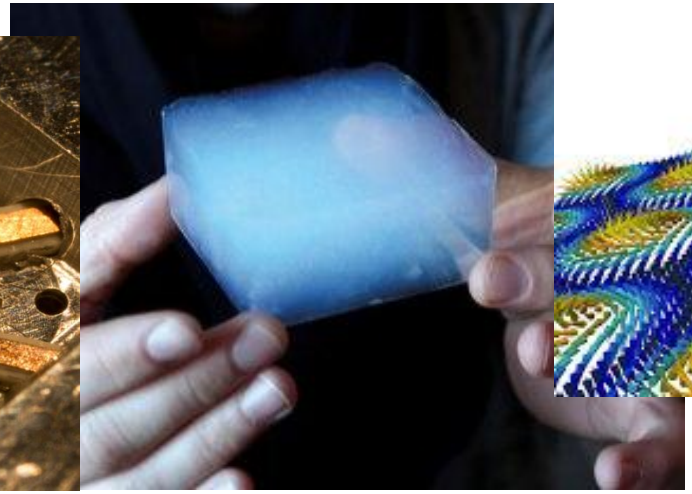
Fizički odsjek, PMF, Zagreb

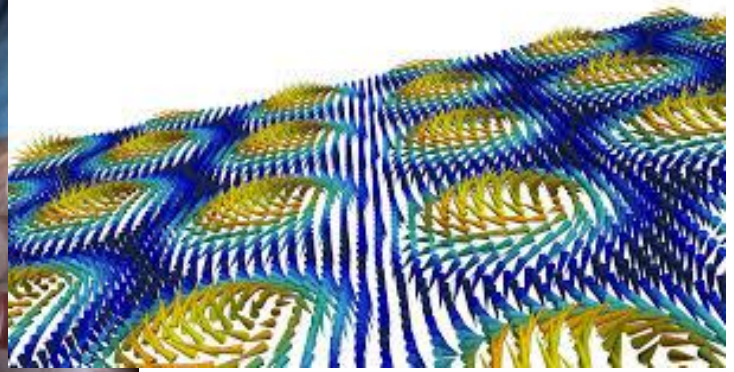
Uvod

- U fizici se stalno traga za novim materijalima zanimljivih svojstava $\longrightarrow$ otkrivanje nove fizike i tehnološka primjena.

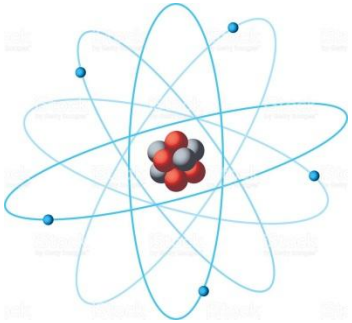
Kako napraviti uzorke novih materijala i pripremiti ih za fizikalna mjerenja?

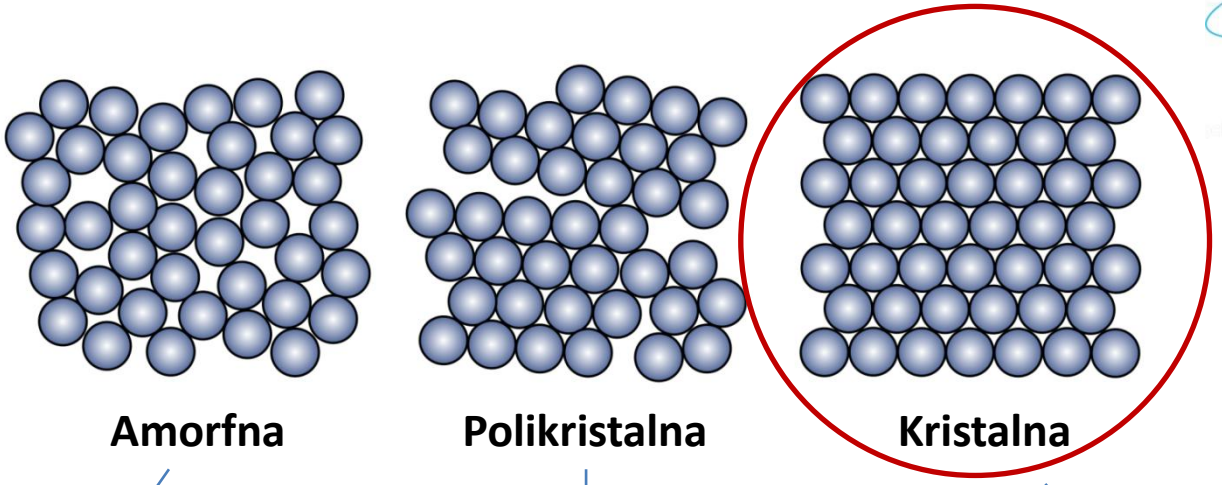






Struktura čvrstih tvari





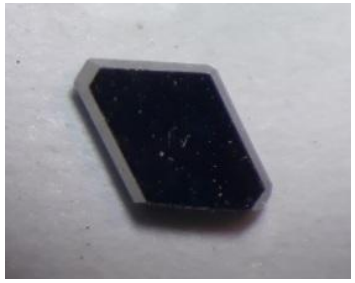
Amorfna | **Polikristalna** | **Kristalna**

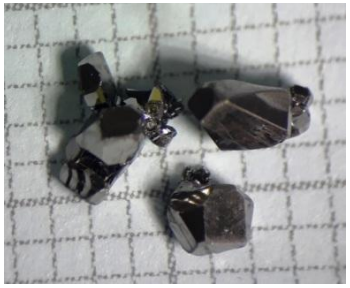
Nasumično raspoređeni atomi.

Sitna zrna u kojima su atomi periodički složeni.

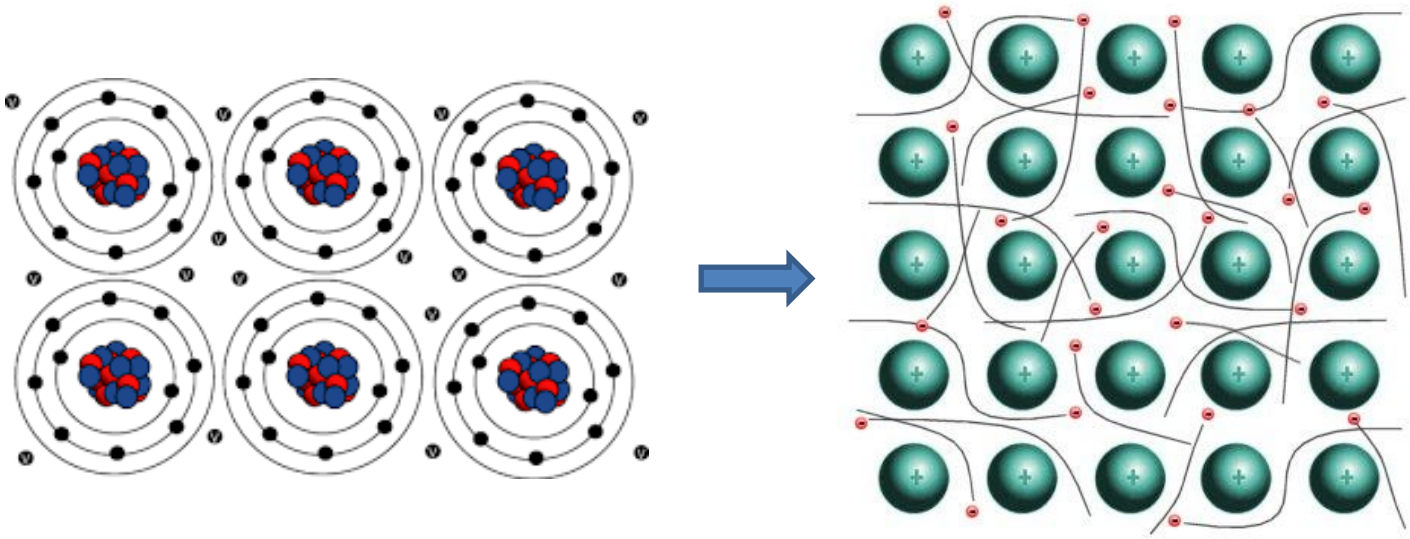
Svi atomi su složeni u periodičku rešetku.

kristalni uzorak ⟶ makroskopski komad materijala kristalne strukture.

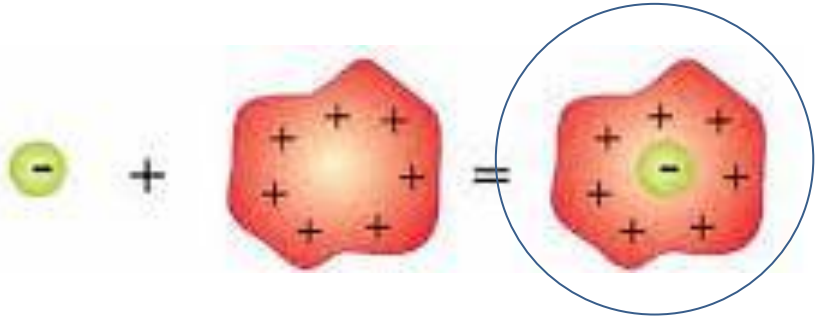




Elektroni u kristalu



kvazičestica



Dizajniranjem kristala mogu se mijenjati svojstva elektrona u njima → brži/sporiji, lakši/teži...

Elektroni u kristalu su **kvazičestice**.

Kako napraviti kristal?

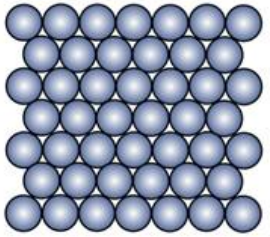
Elementi se zatvaraju u kvarcnu (SiO_2) ampulu.
Unutar ampule je visoki vakuum (10^{-6} mbar)

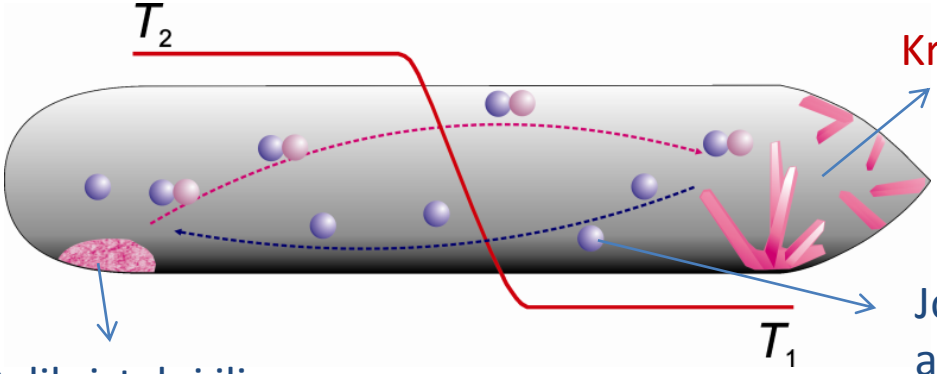
Zataljivanje ampule .

Plamen mješavine vodika i kisika.

Materijal u ampuli s vakuumom.

Kako kristal raste?



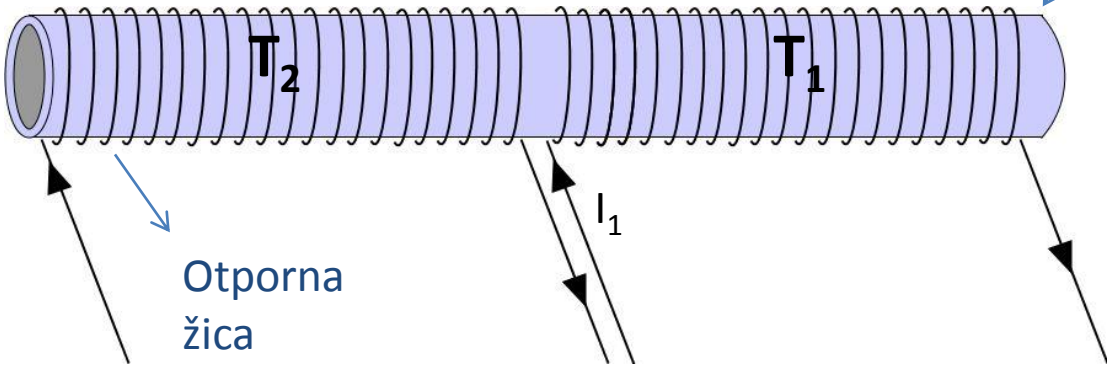


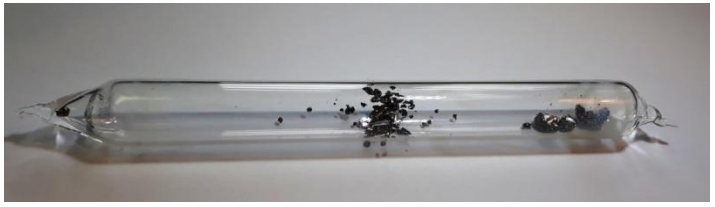
Kristali!

Jod (prenosi atome materijala).

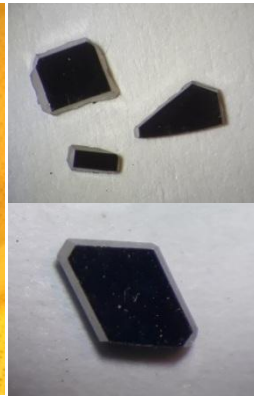
Polikristalni ili amorfni materijal.

Cijev od Al_2O_3

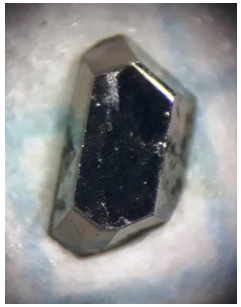




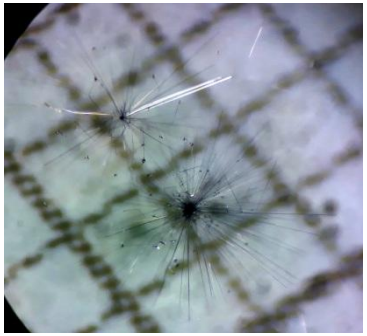
Kristali

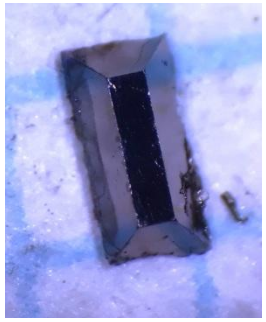


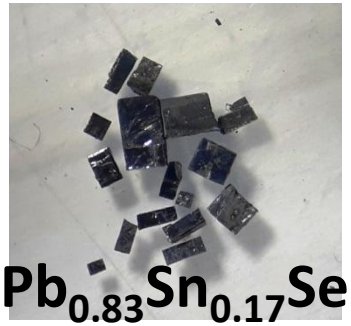
Cd_3As_2



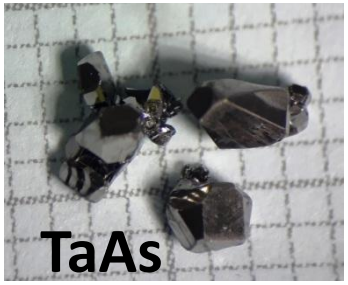
$BiSbTeSe_2$



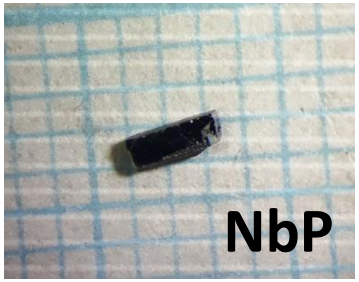




$Pb_{0.83}Sn_{0.17}Se$

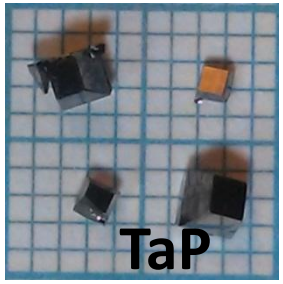


TaAs

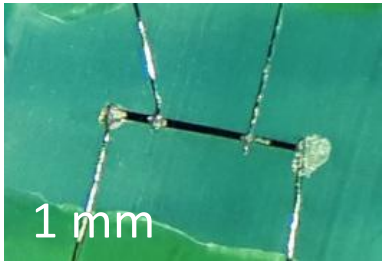


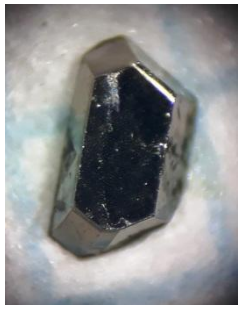
NbP

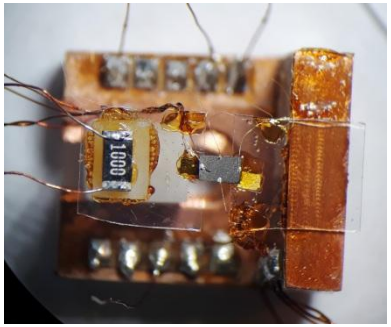
ZrSiS

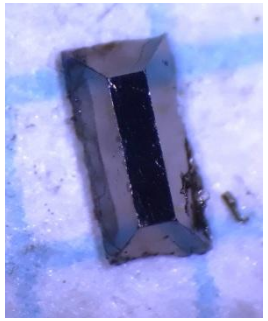


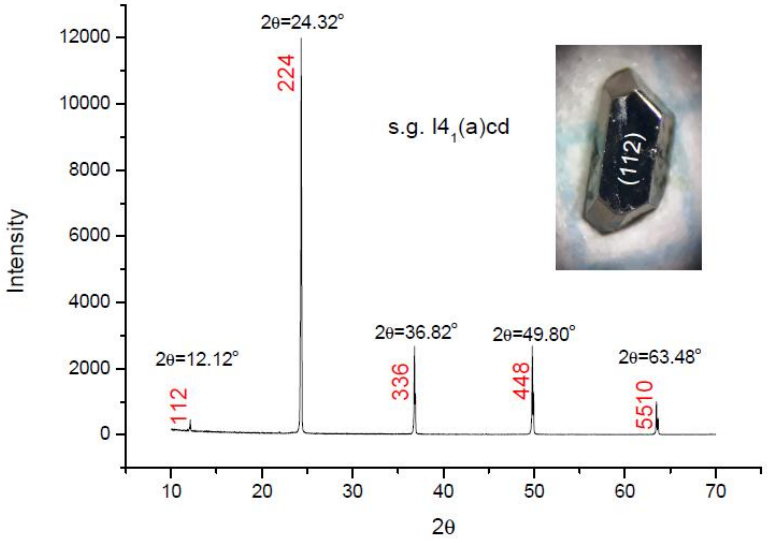
TaP

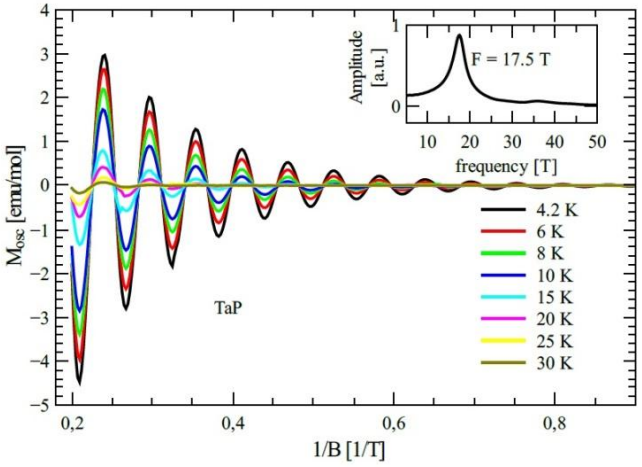

1 mm

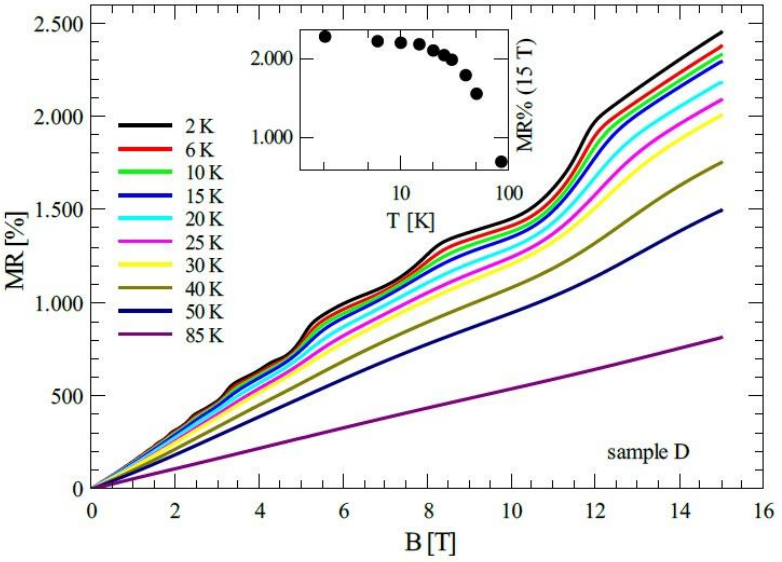







2θ=24.32°
224
s.g. I4$_1$(a)cd
(112)
Intensity
12000
10000
8000
6000
4000
2000
0
2θ=12.12°
112
2θ=36.82°
336
2θ=49.80°
448
2θ=63.48°
5510
10
20
30
40
50
60
70
2θ


Amplitude [a.u.]
F = 17.5 T
frequency [T]
M$_{osc}$ [emu/mol]
TaP
4.2 K
6 K
8 K
10 K
15 K
20 K
25 K
30 K
1/B [1/T]


2 K
6 K
10 K
15 K
20 K
25 K
30 K
40 K
50 K
85 K
MR [%]
T [K]
MR% (15 T)
sample D
B [T]


Hvala na pažnji.
Pitanja?