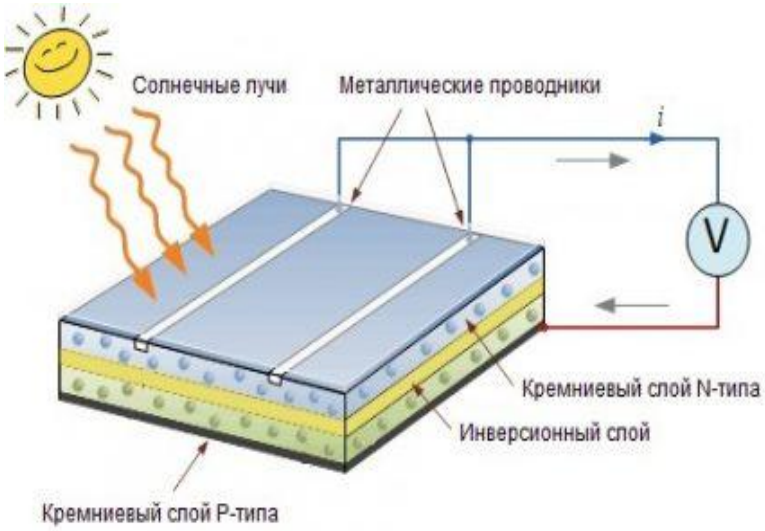
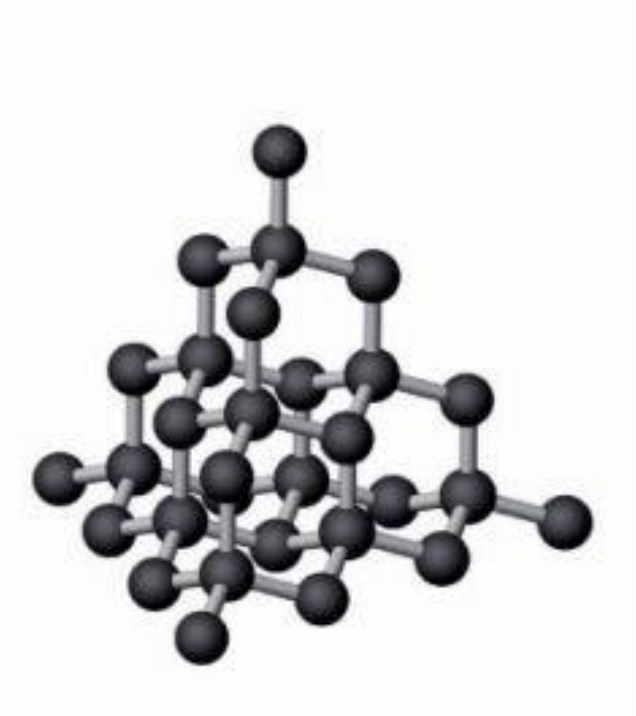
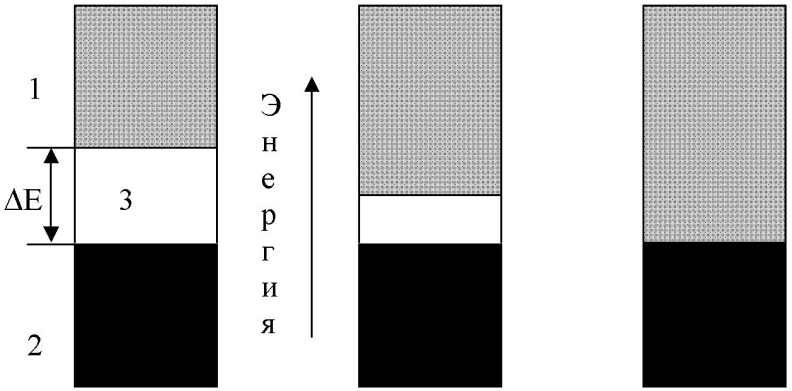
Координационная химия и солнечная энергетика



Профессор Виталий Юрьевич Котов (НИУ “Высшая школа экономики”)

ИЗОЛЯТОРЫ, ПОЛУПРОВОДНИКИ И ПРОВОДНИКИ





1 – валентная зона;
2 – зона проводимости;
3 – запрещённая зона;

ОБРАЗОВАНИЕ ПОЛУПРОВОДНИКА ИЗ РАСТВОРА

$$Pb^{2+} + 2I^{-} = PbI_2$$

И ЕГО РАСТВОРЕНИЕ С ОБРАЗОВАНИЕМ КОМПЛЕКСНЫХ ИЛИ КООРДИНАЦИОННЫХ СОЕДИНЕНИЙ

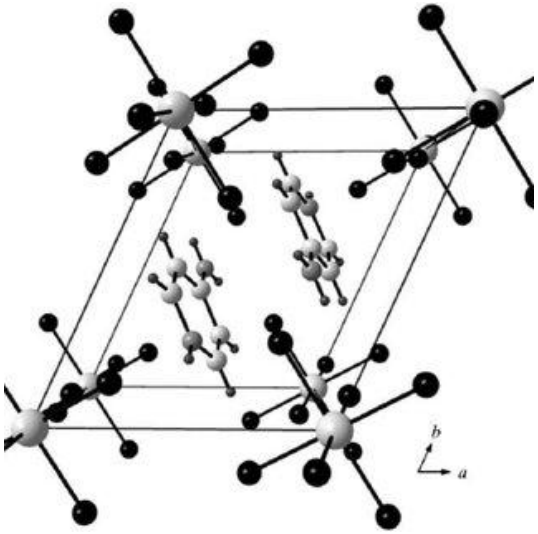
$Pb^{2+} + 2I^- = PbI_2$

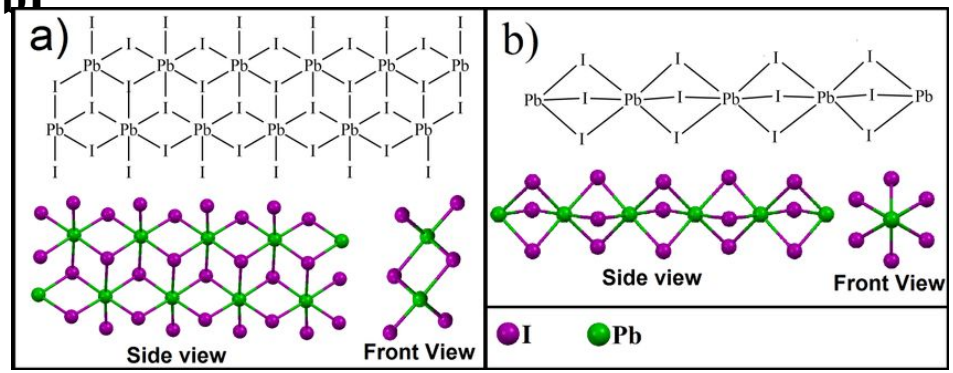
$PbI_2 + I^- = PbI_3^-$

$PbI_3^- + I^- = PbI_4^{-2}$

$PbI_4^{-2} + I^- = PbI_5^{-3}$

$PbI_5^{-3} + I^- = PbI_6^{-4}$





КООРДИНАЦИОННЫЕ СОЕДИНЕНИЯ КОБАЛЬТА (III)

Координационные (комплексные) соединения

координационная теория Вернера – основа для создания номенклатуры и прорыв в теории строения этого класса соединений

«АНАТОМИЯ» КОМПЛЕКСНЫХ СОЕДИНЕНИЙ

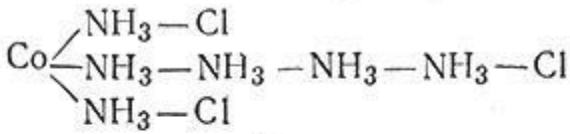
лиганды (от лат. ligare – связывать, соединять)

$$[Ru(NO)(NH_3)_4Cl]\ Cl_2$$

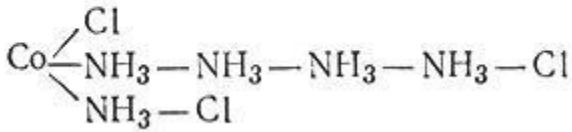
центральный атом (ЦА)

внутренняя сфера

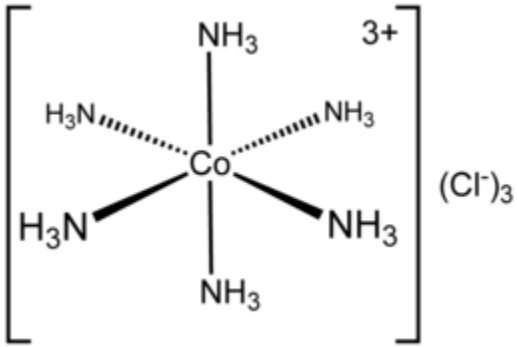
внешняя сфера



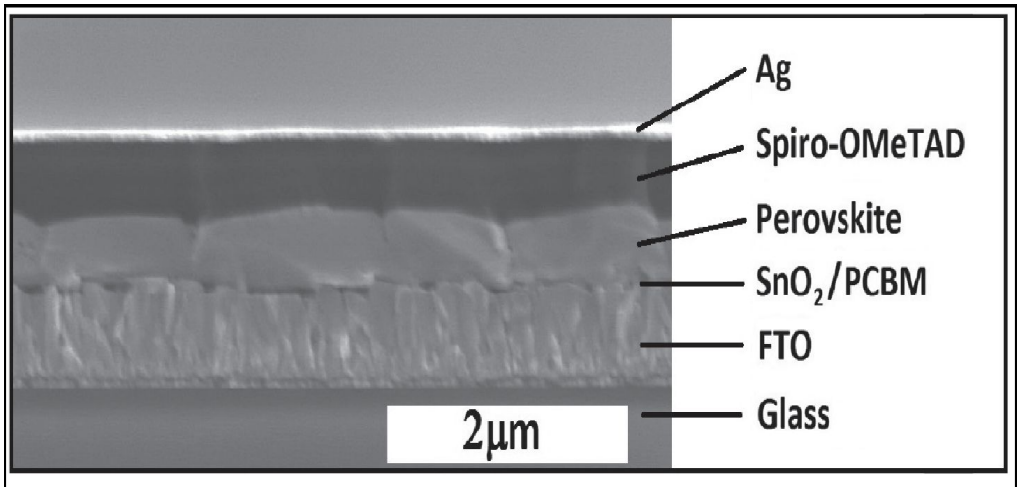
I

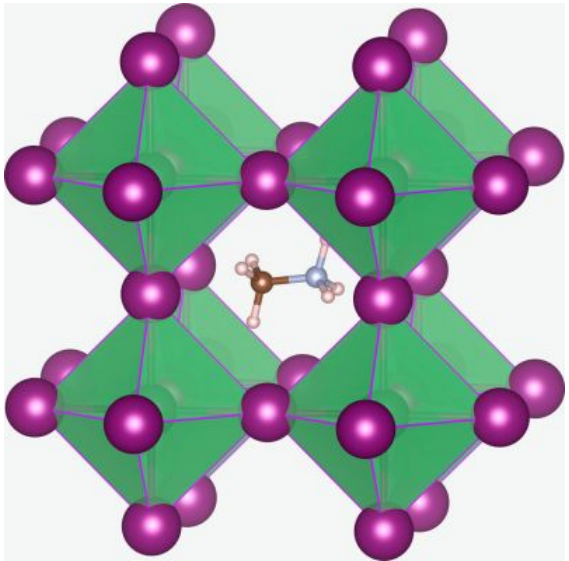


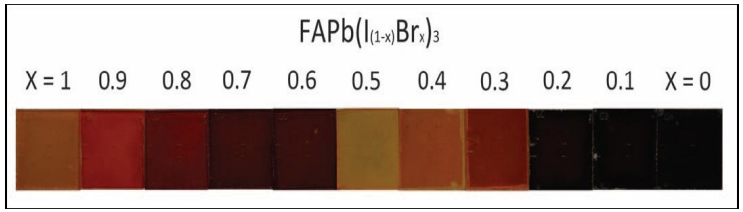
II

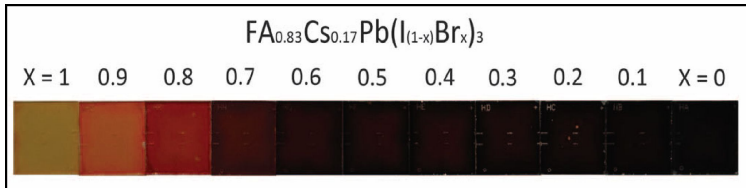


Строение полностью твердотельного солнечного элемента

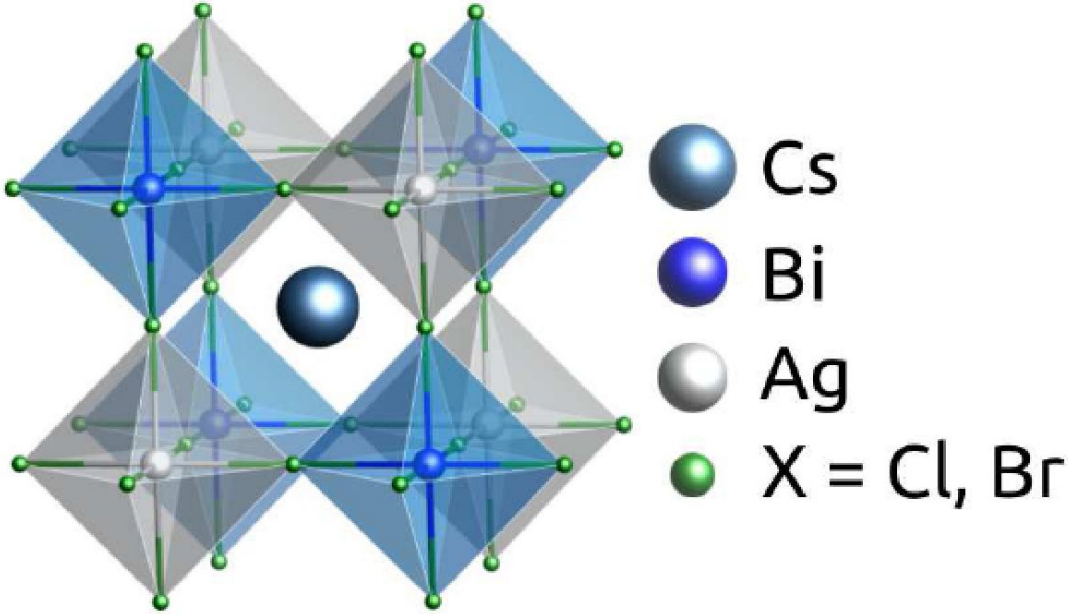




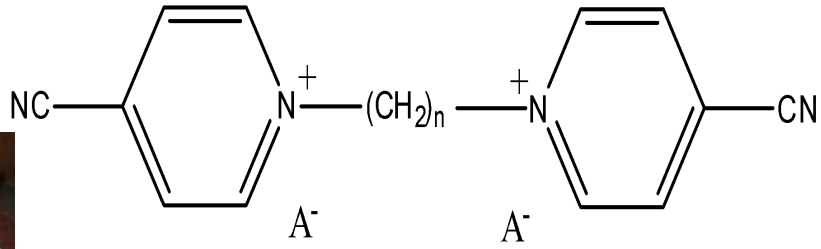


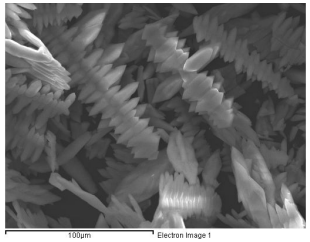


Безсвинцовые перовскиты

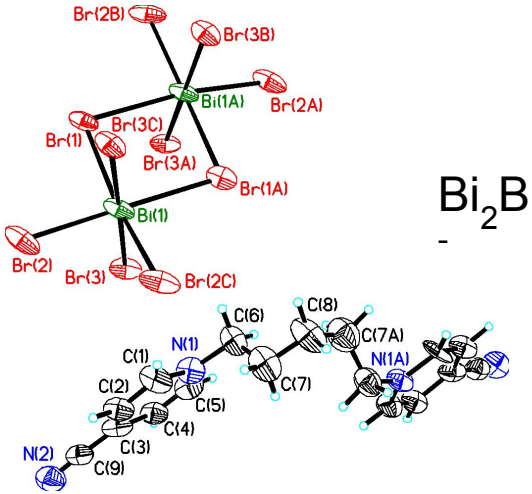


Гибридные галовисмутаты
Галовисмутаты N-гетероциклических катионов

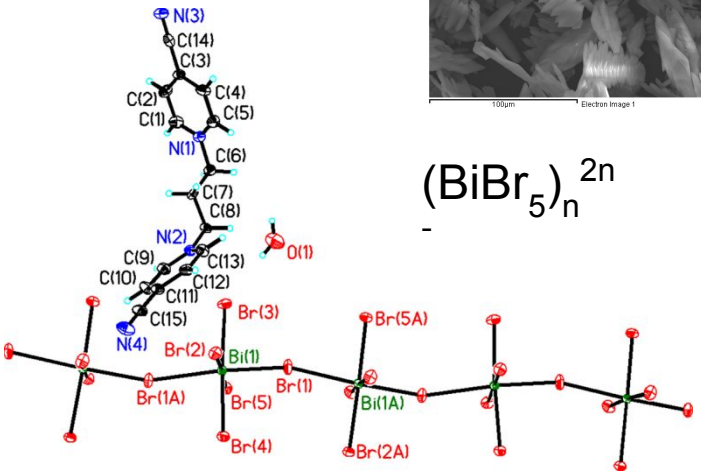




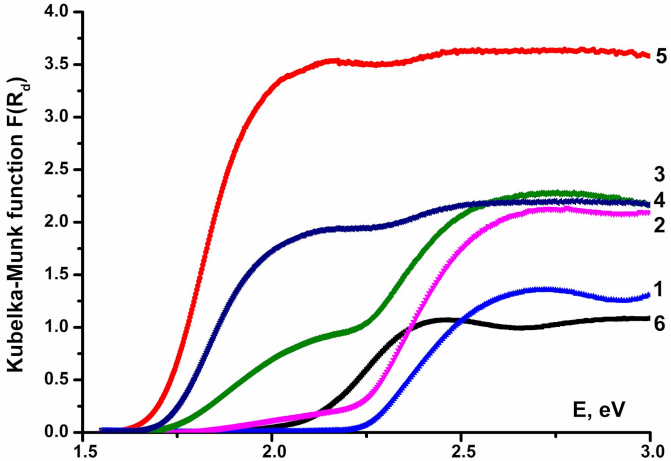
РСтА



$Bi_2Br_{10}^{4-}$



$(BiBr_5)_n^{2n-}$

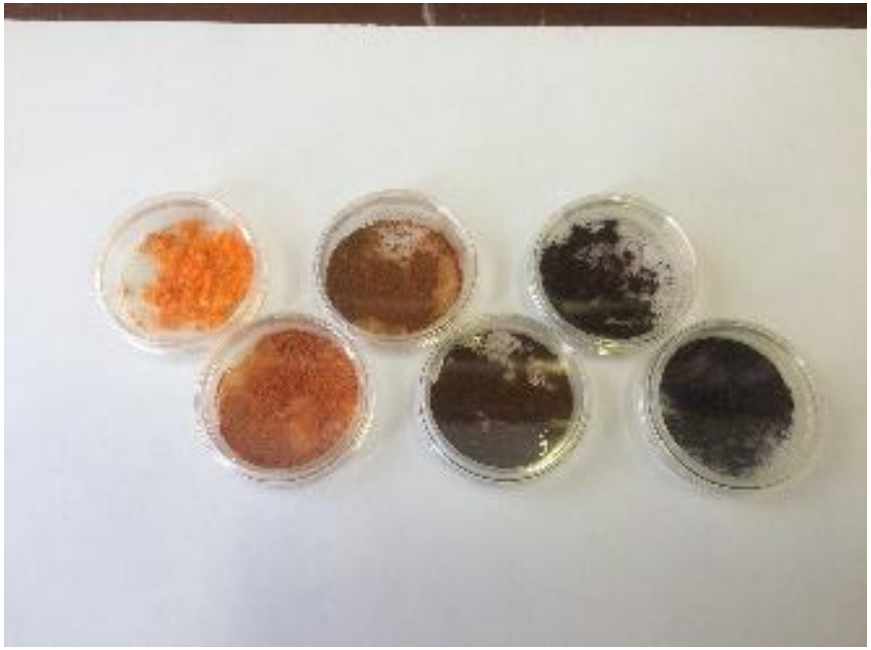


СДО

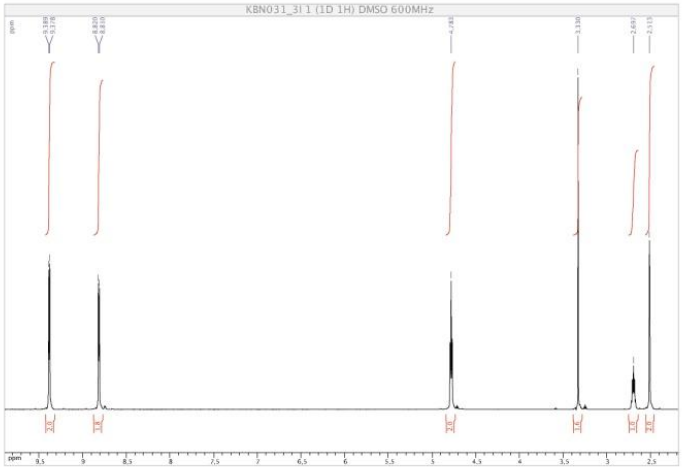
Reflectance spectra

4-CN-PyC-BiBrI·H$_2$O

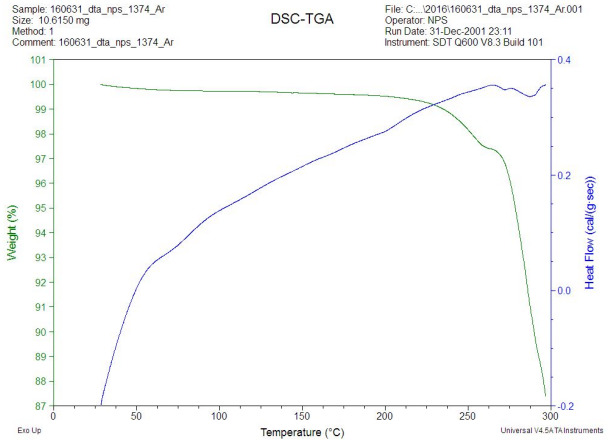
Eg = 1.70 eV



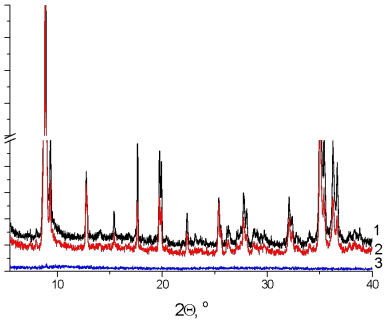
Методы исследования



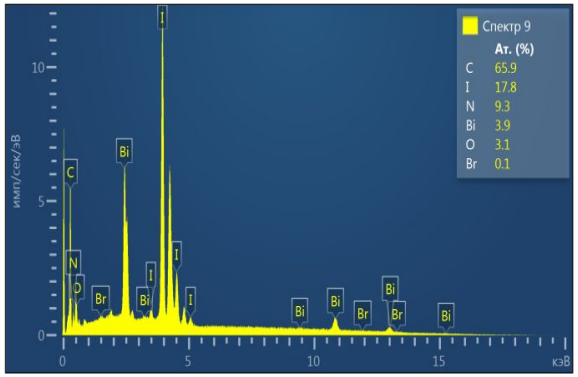
ЯМР



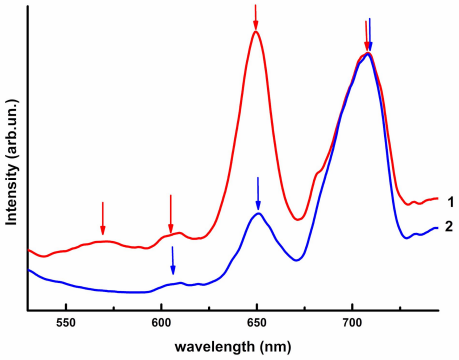
ТГ



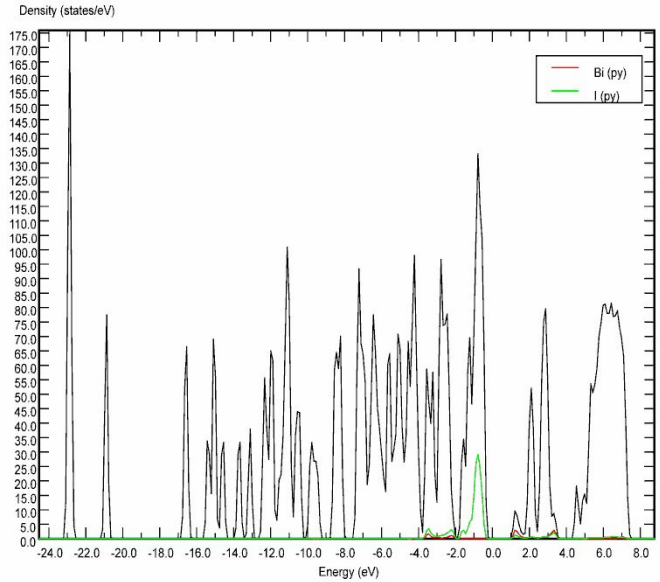
XRD

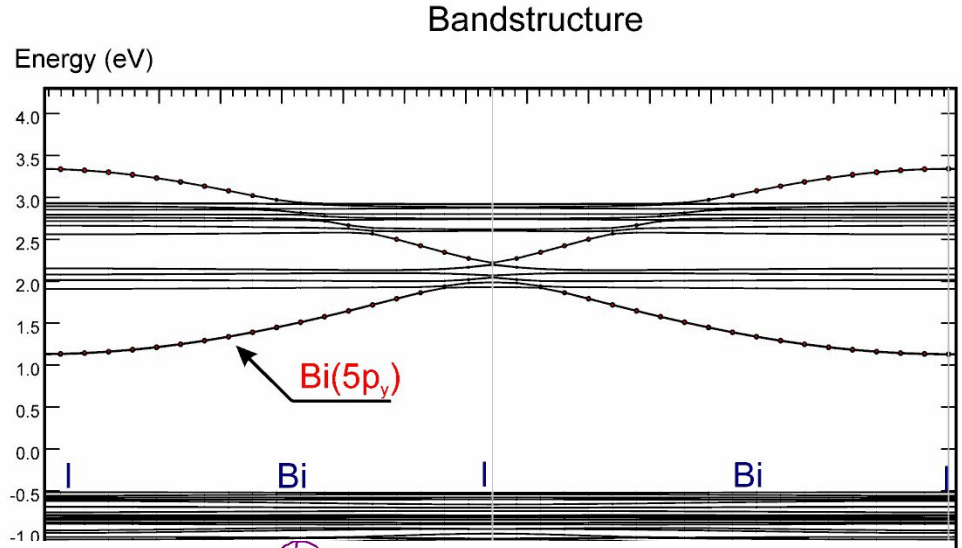


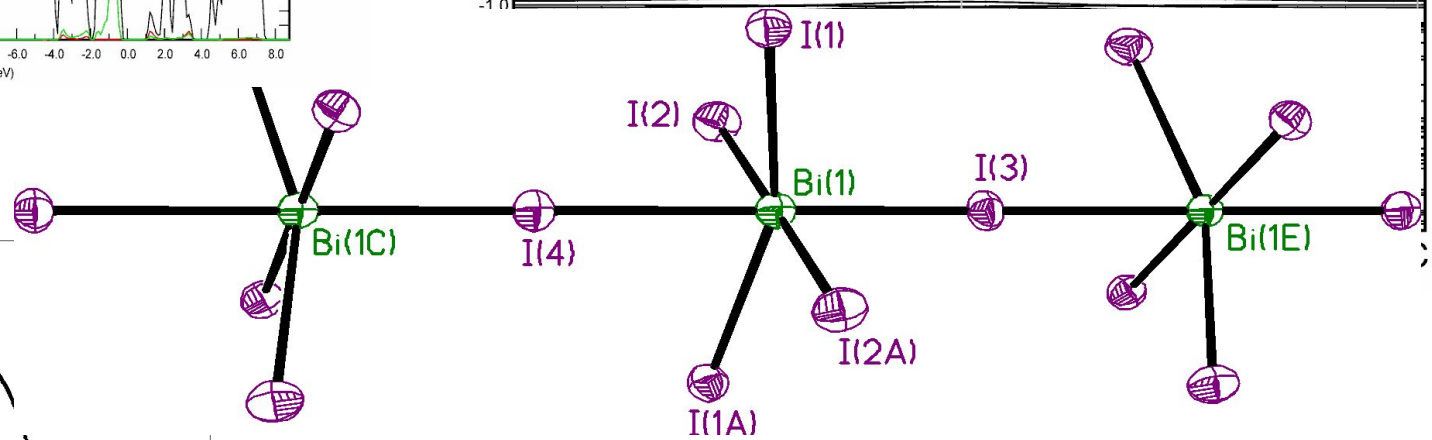
EDX

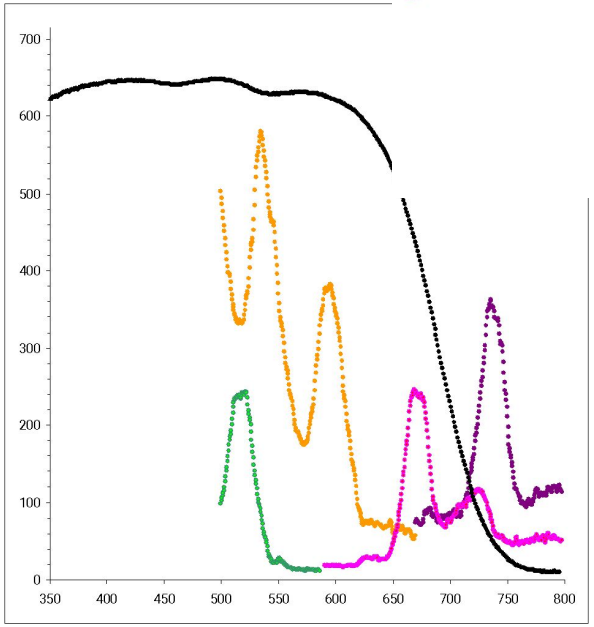


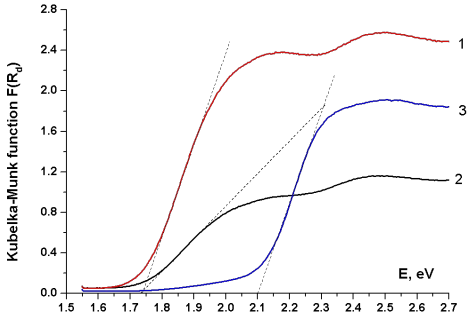
ФЛ







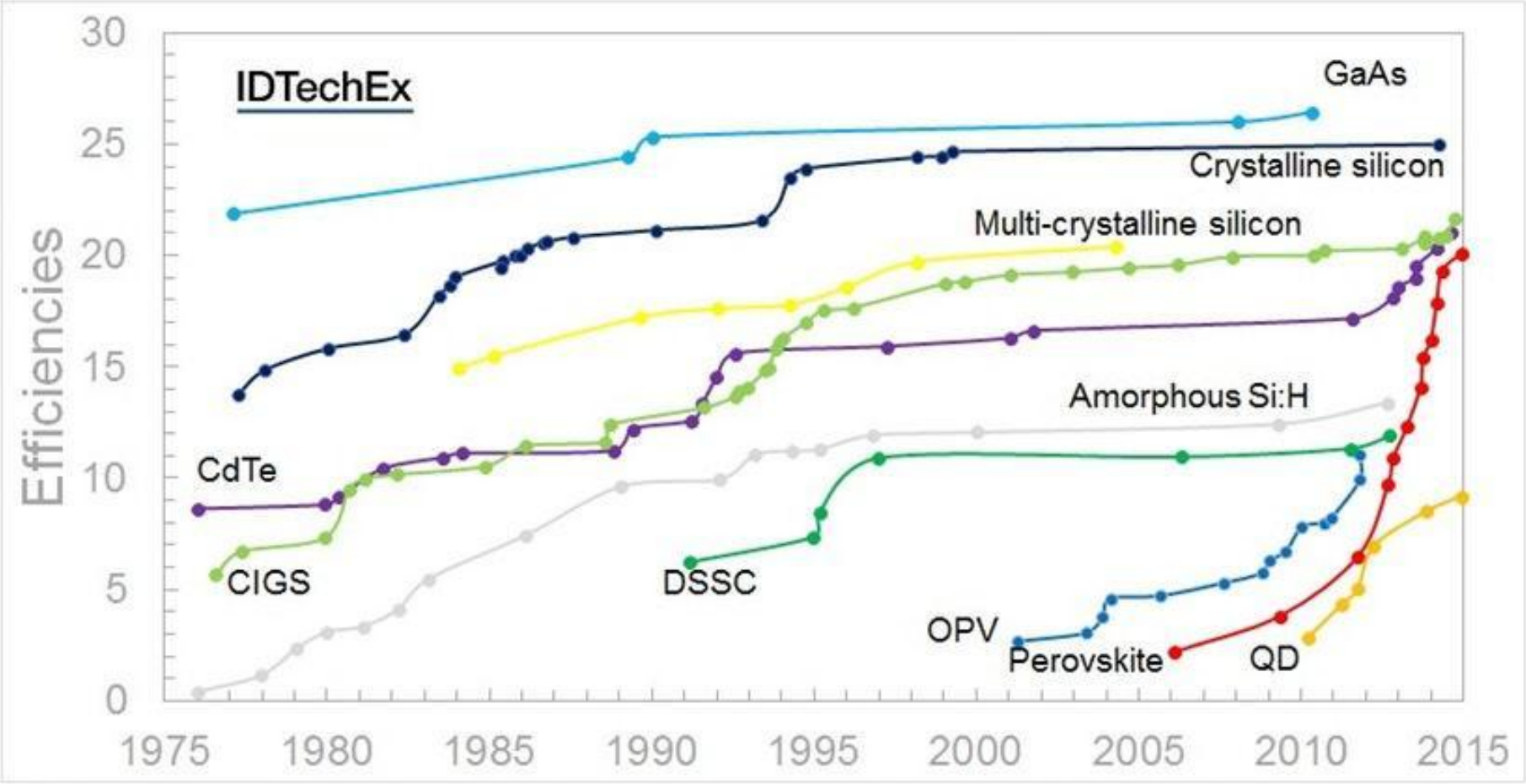




4-CH_3-PyC_5BiI_5

Eg = 1.73 eV

t_{gl} = 231ºC


IDTechEx
Efficiencies
30
25
20
15
10
5
0
1975
1980
1985
1990
1995
2000
2005
2010
2015
GaAs
Crystalline silicon
Multi-crystalline silicon
Amorphous Si:H
CdTe
CIGS
DSSC
OPV
Perovskite
QD