# Defect engineering in Si: usage and controlling of dislocations.

Mikhail Badylevich
*Institute of Solid State Physics, Chernogolovka, Moscow District, 142432 Russia*

All advantages of modern microelectronics mostly caused by breakthrough and success of such field of science as defect engineering of semiconductors, particularly in silicon. Today is well known that controlling and operating of defects inside it could drastically change properties of semiconductors. One-dimensional defects like dislocations are might be interesting for such reasons too.

One of the challenges of present-day semiconductor technology is the development of an optical emitter that is compatible with silicon microelectronics. Possible applications of dislocations for this purpose have been point out by our group. We showed that step-by-step using of aluminium, phosphorous gettering and hydrogen passivation allows to observe strong dislocation related luminescence even at room temperature. The other reported result is that the same technique could be used for increasing the efficiency of dislocation rich poly-Si based solar cells.

Properties of dislocations are strongly depending on interaction with impurities. For example oxygen used for dislocations locking in different steps of silicon wafer production. We found out that magnetic field could strongly influence on the unlocking stress value for dislocation motion. Following investigations showed that effect is in spin-dependent nature. We assume that the magnetic field makes singlet-triplet spin transitions in thermally excited states of oxygen chemically bound to the core of dislocations. These spin transitions stimulate changes in configuration of oxygen atoms in the core resulting in decreasing of unlocking stress.