Introduction to Materials Science and Engineering
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Lecture – 127
Recovery

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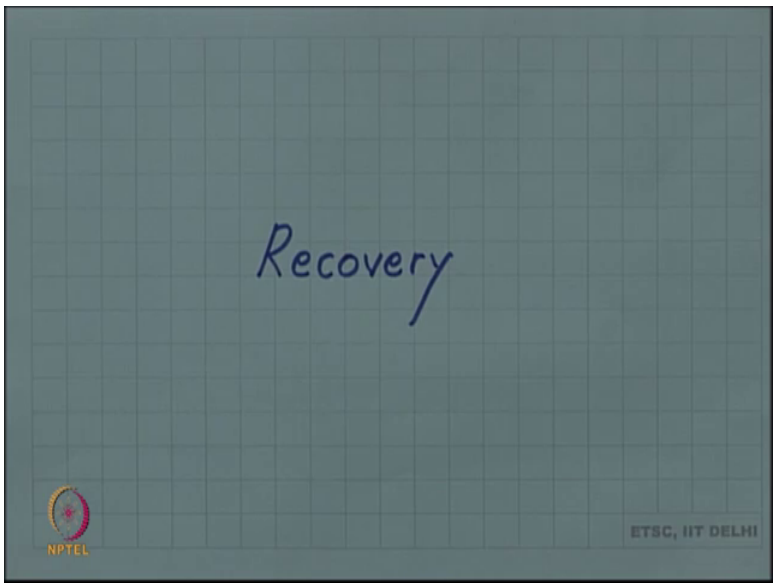

We saw that the deformed material, when it is heated a process called annealing, several processes happen during that by which the property is restored to its earlier value. So, the first stage of such an annealing process is recovery and we will now look at what is happening in recovery.

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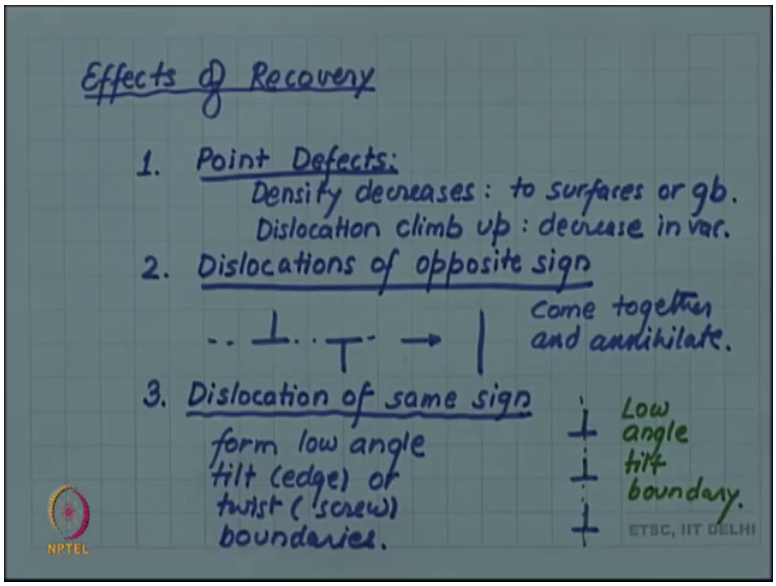

So, effects of recovery. During recovery, the point defects remember during deformation there was increase in the point defect density. So, during recovery point defects again annihilate and the density decreases. So, point defects density decreases and the point defects are annihilated. So, annihilated to surfaces or grain boundary and there is also point defects can annihilate, you know by a mechanism of dislocation climb. So, if dislocation climb climbs up the point defect density the vacancy will come down this we have studied before. So, that is the effect on point defects.

Then dislocations of opposite sign may come together and annihilate. So, you know that if you have a positive dislocation and a negative dislocation on the same slip plane they may come together and form a continuous plane. So, there is no dislocation. So, dislocation of opposite sign come together and annihilate I have shown it for edge dislocation same is true for right handed and left handed screw dislocations.

Dislocation of same sign; if there is excess dislocation then this annihilation may not cancel all of them. So, excess dislocation of the same sign will be left and these dislocations try to align themselves one above the other to reduce their strain energy. So, and you know that under this situation we have; what is called a low angle tilt boundary; similar process; we have not discussed that in this course with a screw dislocation.

So, if a screw dislocations come together, they form a grid of dislocation which gives us low angle twist boundary. So, dislocation of same sign form low angle tilt for edge

dislocation or twist for screw dislocation boundary, this reduces the strain and this is what helps in the recovery of electrical property the electrical conductivity, which we discussed in the introduction to annealing process.