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ELECTROLUMINESCENCE STIMULATED BY SILICON NANOPARTICLES WHICH ARE CREATED BY LASER RECRYSTALLIZATION OF A-SI:H

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The PECVD with 13.56 MHz Industrial Frequency at two electrodes configuration is a standard deposition technique for the deposition of hydrogenated silicon thin films and NIP or PIN structures. This deposition process can be interrupted and the surface of thin film can be modified. In our case we test the behaviour of Si NPs in this structure. The simplest way how to integrate NPs into a-Si:H thin films is to deposit *ex situ* nanoparticles dispersed in liquid by the "drop and dry" way, during the interruption of deposition process. Although this simple method already brought first results [1, 2], its disadvantage is the need to interrupt the vacuum deposition process and just surface coverage by the NPs. The inhomogeneities, visible to naked eye, are characteristic for this simple deposition process. Quite another way is the laser recrystallization of the amorphous structure and although here we realize it *ex situ*, it would be no problem to make the complete deposition process including laser plasma treatment *in situ*.

The results on the first set of three samples recrystallized by excimer laser XeCl are shown on Fig. 1. The SEM pictures of the surface indicates the transition region between smooth and rough recrystallization lies between 100 and 125 mJ/cm^2. While the character of the surface before and after the laser treatment by 100 pulses at 100 mJ/cm^2 is the same, and the recrystallization by 10 pulses at 125 mJ/cm^2 is rough, one pulse at 250 mJ/cm^2 destroy the thin film structure (Fig. 1A).