

# The influence of Fermi energy on structural and electrical properties of laser crystallized P-doped amorphous silicon

Rosari Saleh<sup>a</sup>, ,  and Norbert H. Nickel<sup>b</sup>

<sup>a</sup>Jurusan Fisika, Fakultas MIPA, Universitas Indonesia, 16424 Depok, Indonesia

<sup>b</sup>Hahn-Meitner-Institut Berlin, Kekuléstr. 5, 12489 Berlin, Germany

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## Abstract

A series of phosphorous-doped hydrogenated amorphous silicon films (a-Si:H) were crystallized using step-by-step laser crystallization process. The structural changes during the sequential crystallization process were detected by Raman measurements. The dehydrogenation was monitored by measuring the Si–H local vibrational modes using Raman spectroscopy and hydrogen effusion measurements. Interestingly, hydrogen bonding is affected by doping of the amorphous material. The influence of doping concentrations, thus the Fermi energy on electronic properties has been investigated employing secondary ion mass spectroscopy (SIMS), dark-conductivity- and Hall-effect measurements. The results from hydrogen effusion are consistent with the results obtained from Raman spectroscopy, Hall-effect- and dark-conductivity measurements.

**Keywords:** P-doped polycrystalline silicon; Laser crystallization; Structural and transport properties; H bonding

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