HL 44 Si/Ge

Time: Thursday 12:15–13:15 Room: BEY 118

HL 44.1 Thu 12:15 BEY 118

Polycrystalline Silicon Films Obtained from Spin-coated Dispersed Nanocrystalline Silicon Layers — •R. Lechner[1], Nuryanti[1], C. Oberhüttinger [1], M. S. Brandt[1], A. Ebbers[2], F.-M. Petrat[2], and M. Stutzmann[1] — [1]Walter Schottky Institut, Technische Universität München, Am Coulombwall 3, 85748 Garching — [2]Degussa AG, Paul-Baumann-Str. 1, 45764 Marl

Polycrystalline silicon thin films on inexpensive substrates are of interest for thin film electronics and large area applications such as display panels or solar cells. A method known to produce continuous films of high quality polycrystalline silicon at relatively low temperatures is the aluminum induced layer exchange (ALILE). This process can be used to crystallize amorphous silicon deposited onto metal aluminum layers by simple annealing of the bilayer a-Si/Al stack at temperatures ranging from 300°C to 570°C. Here, we present first results obtained by replacing the amorphous silicon film by a layer of silicon nanoparticles spin-coated from dispersion with an organic solvent. Despite the crystalline nature of the initial nanocrystalline silicon layers and their high porosity, the growth of polycrystalline nuclei has been observed during annealing. By an appropriate choice of the sample configuration, conductive layers of polycrystalline silicon can be obtained. The structural, optical and electrical properties of the resulting films will be discussed.

HL 44.2 Thu 12:30 BEY 118

Phase segregation in laser-crystallized polycrystalline SiGe thin films — •Moshe Weizman[1], Norbert Nickel[1], Ina Sieber[1], and Baojie Yan[2] — [1]Hahn-Meitner-Institut Berlin, Kekuléstr. 5, 12489 Berlin, Germany — [2]United Solar Systems Corp. 1100 West Maple Road Troy, MI 48084, USA

Polycrystalline silicon-germanium (poly- SiGe) thin films on glass substrate are considered to be attractive for thin film electronic devices and for solar cells applications. The SiGe thin films investigated in this work were fabricated on glass and stainless steel substrates by the following steps. At first, amorphous silicon-germanium films (a-Si1-xGex:H) with 0.19<x<0.84 were deposited by glow-discharge decomposition of a mixture of disilane, germane, and hydrogen to a thickness of 100 to 255 nm. Secondly, the amorphous samples were crystallized employing a XeCl excimer laser. Phase segregation in the poly SiGe films was studied mainly by energy dispersive X-ray (EDX) and Raman backscattering measurements. The results show that laser crystallization of poly-Si1-xGex thin films on glass with 0.33<x<0.7 can reveal significant segregation into Ge rich and poor areas, which deviate by up to 40% from the homogeneous composition of the amorphous starting material. The Ge rich and poor areas are self assembled with a well defined periodicity length. Surprisingly, laser-crystallized SiGe thin films on stainless steel substrate under similar crystallization conditions show no detectable segregation and no self organization. These results are explained on the base of the Mullins-Sekerka instability growth model calculated for the case of SiGe alloys.

HL 44.3 Thu 12:45 BEY 118

Ultra-thin polycrystalline silicon layers on glass substrates — •Michael Scholz, Tobias Antesberger, Sebastian Gatz, Mario Gjukic, and Martin Stutzmann — Walter Schottky Institut, Technische Universität München, 85748 Garching, Germany

An emerging method for the low-temperature preparation of polycrystalline silicon (poly-Si) layers with reasonable structural and electrical properties on non-crystalline substrates is the aluminum-induced layer exchange (ALILE) process. To this end, a bilayer structure of aluminum (Al) and amorphous silicon (a-Si) is deposited e.g. on a glass substrate and heated to temperatures below the eutectic temperature of the binary Al-Si system (577 °C). If the layers a separated by a thin oxide (aluminum oxide or silicon dioxide) the two layers exchange their respective positions and a coherent poly-Si film is formed.

The preparation of these films was investigated as a function of the annealing temperature and the overall thickness of the layer system, respectively. In addition, the optical and the electrical properties will be discussed.

HL 44.4 Thu 13:00 BEY 118

MOCVD of Epitaxial Germanium Nanowires on Silicon — •Tim Echtermeyer, Stephan Senz, Volker Schmidt, and Ulrich Goesele — Max-Planck-Institute of Microstructure Physics, Weinberg 2 06120 Halle, Germany

We present results on germanium nanowires grown epitaxially on a silicon ¡111¿ substrate with the help of a metalorganic germanium precursor. The nanowires produced by this novel approach are investigated by transmission and scanning electron microscopy. In addition, preliminary results regarding silicon/germanium heterostructure nanowires are presented.