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Evolution of Nickel Silicide contacts in Silicon nanowires during thermal cycling

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Thermally activated axial intrusion of nickel silicides into the silicon nanowire (NW) from pre-patterned Ni reservoirs is used in formation of nickel silicide/silicon contacts in SiNW field effect transistors. This intrusion consists usually of different nickel silicide phases which grow simultaneously during thermal annealing (TA). The growth during thermal cycling is often accompanied by local thickening resulted in formation of pea-like profile, and tapering of the NW, up to full disintegration of segments adjacent to the silicon. In the present work this process was investigated in SiNWs of 30-60 nm in diameters with pre-patterned Ni electrodes after several rapid TAs at 400^{0}C, 420^{0}C and 440^{0}C and times up to 15 s. The process was analyzed in the framework of a model taking into account simultaneous formation of two silicide phases in the NW. Additional flux of atoms caused by the NW curvature gradients due to different radii of different silicides was taken into account as well. For a certain set of parameters thickening of the nickel-rich silicide intrusion and tapering of the monosilicide part of intrusion were obtained.

Biography

Alex Katsman has completed his Ph.D at the age of 30 years from Ural State Technical University, Yekaterinburg, Russia. Since 1991 he works as a senior researcher in the Department of Materials Science and Engineering of Technion- Israel Institute of Technology, Haifa. He has published more than 50 papers in reputed journals and participated in more than 30 International Conferences on Materials Science and Engineering.

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