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Abnormal behaviors in galvanically displaced Au nanostructure on silicon below and above percolation threshold a coverage of Au nanostructure.[1] SEUNG-HOON LEE, Department of Physics, Pukyong National University, SEONGPIL HWANG, Department of Advanced Materials Chemistry, Korea University, JUNG HYUN JEONG, JAE-WON JANG[2], Department of Physics, Pukyong National University — Temperature dependent resistivity of galvanically displaced Au nanostructure (NS) on p-type Silicon (p-Si) was investigated by tuning a coverage of Au NS below and above a percolation threshold (p_c) in temperature range of 10-300K. Below p_c [Au nanoparticles are deposited on p-Si], the temperature coefficient of resistivity (TCR) and cryogenic sensitivity (S_v) of p-Si in the low-temperature region (10–30 K) are remarkably improved upto 35% of TCR and 5785% of S_v in Au coverage of 21.9% compared to p-Si. Above p_c [Au nanofeatures (NFs) are deposited on p-Si], the resistivity of the Au NFs on p-Si show metal to semiconductor transition (MST) as the temperature increases and the temperature of the MST is tuned from 145 to 232 K as Au% is changed from 82.7 to 54.3%. Our investigation can propose a new optoelectronic application by galvanic displacement method and can provide the better understanding for effect of metal NS on doped semiconductor in the galvanic displacement method.

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