In-situ Ga doping of fully strained Ge$_{1-x}$Sn$_x$ heteroepitaxial layers grown on Ge(001) substrates

We have investigated the Ga and Sn content dependence of the crystallinity and electrical properties of Ga-doped Ge$_{1-x}$Sn$_x$ layers that are heteroepitaxially grown on Ge(001) substrates. The doping of Ga to levels as high as the solubility limit of Ga at the growth temperature leads to the introduction of dislocations, due to the increase in the strain of the Ge$_{1-x}$Sn$_x$ layers. We achieved the growth of a fully strained Ge$_{0.922}$Sn$_{0.078}$ layer on Ge with a Ga concentration of 5.5×10$^{19}$/cm$^3$ without any dislocations and stacking faults. The resistivity of the Ga-doped Ge$_{1-x}$Sn$_x$ layer decreased as the Sn content was increased. This decrease was due to an increase in the carrier concentration, with an increase in the activation level of Ga atoms in the Ge$_{1-x}$Sn$_x$ epitaxial layers being induced by the introduction of Sn. As a result, we found that the resistivity for the Ge$_{0.950}$Sn$_{0.050}$ layer annealed at 600°C for 1 min is 3.6 times less than that of the Ga-doped Ge/Ge sample.

General information
State: Published
Organisations: Department of Micro- and Nanotechnology, Nagoya University, IMEC, Capres A/S
Pages: 3206-3210
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: Thin Solid Films
Volume: 520
Issue number: 8
ISSN (Print): 0040-6090
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 1.91 SJR 0.617 SNIP 0.864
Web of Science (2017): Impact factor 1.939
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.83 SJR 0.639 SNIP 0.881
Web of Science (2016): Impact factor 1.879
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 1.84 SJR 0.68 SNIP 0.923
Web of Science (2015): Impact factor 1.761
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.94 SJR 0.725 SNIP 1.075
Web of Science (2014): Impact factor 1.759
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2 SJR 0.814 SNIP 1.195
Web of Science (2013): Impact factor 1.867
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 1.86 SJR 0.897 SNIP 1.153
Web of Science (2012): Impact factor 1.604
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 2.13 SJR 0.995 SNIP 1.323
Web of Science (2011): Impact factor 1.89