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Long-range Ordered Surface Phase in Liquid $AuSi_xGe_{1-x}$ Eutectic Alloys VENKAT BALAGURUSAMY, STEFAN SELLNER, EYAL YAHEL, DEAS, Harvard Univ., OLEG SHPYRKO, MOSHE DEUTSCH, Bar Ilan Univ., Israel, ALEXEI GRIGORIEV, DEAS, Harvard Univ., PETER PERSHAN, DEAS and Physics Dept., Harvard Univ. — Synchrotron Xray studies of the free surface of the liquid phase of the $Au_{82}Si_{18}$ eutectic show that it is coated with a 2D $AuSi_2$ crystalline monolayer[1]. In contrast the surfaces of comparable liquid phases of $Au_{73}Ge_{27}$ and $Au_{77}Ge_{14}Si_9$ resemble normal liquids without surface crystalline order. The differences are presumably caused by the fact that Ge has a lower surface tension than both Si and Au and as a result Si is displaced from the surface. The amount of Ge in a lower concentration alloy($Au_{82}Si_{18-x}Ge_x$, x$\leq$ 1 atm%) is not sufficient to completely replace the surface Si and in this alloy and the 2D lattice structure order is identical to that of $Au_{82}Si_{18,}$ except for the $\sim$ 20K higher melting temperature of the 2D lattice and the fact that it is a bilayer, rather than a monolayer[1].
[1] Shpyrko, O.G., et al., *Surface crystallization in a liquid AuSi alloy.* Science, **313**.77(2006)

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