|  |  |  |  |
| --- | --- | --- | --- |
| **Title:** | Ordered mixed rows of (Pb+Sn) and (Pb+Sb) on Cu(001) : A coadsorption study and structure determination using low energy electron diffraction | | |
| **Author(s) Name:** | M. Kabiruzzaman, R. Ahmed, T. Nakagawa, and S. Mizuno | | |
| **Contact Email(s):** | kabiruzzaman@aiub.edu | | |
| **Published Journal Name:** | Surface Science | | |
| **Type of Publication:** | Journal | | |
| **Volume:** | 677 | Issue | November 2018 |
| **Publisher:** | Elsevier | | |
| **Publication Date:** | 24 June 2018 | | |
| **ISSN:** | 2949-821X | | |
| **DOI:** | https://doi.org/10.1016/j.susc.2018.06.002 | | |
| **URL:** | https://www.sciencedirect.com/science/article/abs/pii/S0039602818302346 | | |
| **Other Related Info.:** | Page 128-134 | | |
|  | | | |

|  |  |
| --- | --- |
| **Abstract:** |  |
| The surface alloys of (Pb, Sn) and (Pb, Sb) on Cu(001) obtained via the coadsorption method were independently determined using tensor low-energy electron diffraction (LEED). Both surface alloys were obtained under the p(4 × 4) phase. The determined structures consisted of mixed rows of the adsorbates in a one-dimensional chain arrangement. These mixed rows are buckled differently in each row. The best-fit structure indicates that the Sn or Sb atoms are located on the four-fold hollow sites while the Pb atoms are displaced toward the vacancies. The bond lengths of Sn or Sb atoms with Cu underneath of the alternative mixed chains are reduced by 4.8% or 5.9%, respectively, compared to the bulk values. We consider that, the large reductions of these bond lengths and the tendency of the adsorbates to make alloy at the surface stabilize the structure. The other structural parameters, bonding effects of the surrounding Cu atoms with the adsorbates, and similar characteristics of the elements located in the same period of periodic table are discussed in detail. On the basis of the structural characterization, the mechanisms of the formation of the p(4 × 4) phase are proposed. | |