| 발표번호 | D-06[14:45-15:00] |
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| 분과 | 응집물질물리학분과 (Condensed Matter Physics Division) |
| 저자 | KIM Minkook (발표자 학생), OH Dong-Hwa[1], BAIK Jaeyoon[2], JEON Cheolho[3], PARK Chong-Yun, AHN Joung Real<br>*BK21 Physics Research Division and Center for Nanotubes and Nanostructured Composites (CNNC), Sungkyunkwan University, Suwon 440-746, Korea.* [1]*BK21 Physics Research Division, Sungkyunkwan University, Suwon 440-746, Korea.* [2]*Center for Nanotubes and Nanostructured Composites (CNNC), Sungkyunkwan University, Suwon 440-746, Korea, Beamline Research Division, Pohang Accelerator Laboratory, POSTECH, Pohang 790-784, Korea.* [3]*Center for Nanotubes and Nanostructured Composites (CNNC), Sungkyunkwan University, Suwon 440-746, Korea.* |
| 제목 | One-dimensional Phase Separation on a vicinal Si(111) surface |
| 초록본문 | We studied the one-dimensional (1D) phase separation of the 5×5 and 7×7 phases on vicinal Si(111) surfaces using scanning tunneling microscopy and first principle calculations. A small change of the crystallographic orientation of a Si(557) surface produced two types of (111) terraces with different widths (L), and stabilized the 5×5 phase and separated it from the 7×7 phase, while only the 7×7 phase is stable on the Si(557) surface. Interestingly, this makes a 1D (111) terrace prefer selectively only one of the 5×5 and 7×7 phases resulting in long-range orders along the step edge direction above 300nm. The widths of 1D 5×5 and 7×7 domains were L=12 and L=9, which are close to that of the single unit cell of a 5×5 phase and the half unit cell of a 7×7 phase. However, the 1D 5×5 and 7×7 phases were arranged randomly across the step edge direction. This anisotropic coherent length of the 5×5 and 7×7 phases implies that the phase separation is strictly 1D. These phases were stable energetically by terminating their unit cell boundary at the step edges at room temperature, which is supported by first principle calculations. In this presentation, we will introduce the detailed STM images of 1D phase separation on vicinal Si(557) surfaces compared with a Si(557) surface and will describe the relative stability of the separated 5×5 and 7×7 phases on (111) terrace with a finite width (L) using first principle calculations. |

| 발표번호 | D-11[16:15-16:30] |
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| 분과 | 응집물질물리학분과 (Condensed Matter Physics Division) |
| 저자 | SONG Inkyung (발표자 학생), OH Dong-Hwa[1], NAM Jeong Ho[2], KIM Minkook, JEON Cheolho[2], PARK Chong-Yun[2], AHN Joung Real[2]<br>*BK21 Physics Research Division and Center for Nanotubes and Nanostructured Composites (CNNC), Sungkyunkwan University, Suwon 440-746, Korea.* [1]*BK21 Physics Research Division, Sungkyunkwan University, Suwon 440-746, Korea.* [2]*Center for Nanotubes and Nanostructured Composites (CNNC), Sungkyunkwan University, Suwon 440-746, Korea.* |
| 제목 | Indium-induced triple-period atomic wires on a vicinal Si(111) surface: In/Si(557) |
| 초록본문 | An indium-induced one-dimensional (1D) surface reconstruction on a Si(557) surface was studied by the combined approach of scanning tunneling microscopy (STM) and first principles calculations. Low-energy electron diffraction revealed a (1×3) phase with a triple-period along the step edge direction, which was also confirmed by STM. The STM images showed that the 1D structure consists of two atomic chains. One is located on the terrace and consists of triple-period bright protrusions. The other shows a weak ×3 modulation at the step edge. Five atomic structure models based on the In adatom of a In/Si(111)-r3×r3 surface were considered to figure out the underlying structure of the STM images of the In/Si(557)-1×3 surface. Interestingly, a heterogeneous In-Si adatom chain model reproduced most of the features of STM images and was the most stable energetically at a wide range of In chemical potential. |

| 발표번호 | D-12[16:30-16:45] |
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| 분과 | 응집물질물리학분과 (Condensed Matter Physics Division) |
| 저자 | SHIN Bong Gyu (발표자 학생), KIM Minkook, OH Dong-Hwa, PARK Chong-Yun, AHN Joung Real<br>*BK21 Physics Research Division, Sungkyunkwan University, 300 Cheoncheon-dong, Jangan-gu, Suwon 440-746, Republic of Korea.* |
| 제목 | Room Temperature Growth Of Magic Atomic Wires On The Si(557) Surface |
| 초록본문 | We have investigated magic atomic wires on the Si(557) surface using first-principles calculations and scanning tunneling microscope (STM). The reconstructed Si(557) surface is composed of one (111) terrace and three (112) terraces in its single unit cell[1]. STM images showed that the indium-induced magic atomic wires form on the second and third (112) terraces at room temperature. The whole unit cell is too large to be calculated. For this reason, we considered only the (112) terraces. Structural models are thus based on the bulk terminated Si(112)-(1x1) surface[2]. For a reasonable approach, we testified various structural models based on the basic building blocks of the In/Si(111) surfaces; In/Si(111)-(7x7), -(4x1), and -(root3xroot3)R30degrees. We found the one-dimensional counterpart of the indium magic cluster on the Si(111)-(7x7) surface was the most stable structure. In the structural model, indium atoms preferred to replace Si adatoms. The simulated STM images of the structural model were matched with the observed line protrusion. [1] Himpsel *et al.* Applied Physics Letters 79, 1608 (2001), [2] Oh *et al.* Physical Review B 77, 155430 (2008) |