

Iodine adsorption on Ni(100): structural phase transitions and reconstruction

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Iodine adsorption on Ni(100) has been intensively studied since the beginning of the 1980s and was considered to be one of the best understood halogen adsorption systems [1]. In present work, we examined the I/Ni(100) system with STM, LEED and DFT techniques and concluded that structural models suggested in the early works are incorrect. According to STM data, a simple $p(2 \times 2)$ structure is formed at coverage of 0.25 ML (Fig.1a). Further iodine dosing gives rise to appearance of the zig-zag heavy domain walls separating neighbouring antiphase $p(2 \times 2)$ domains (Fig.1b). As iodine is adsorbed more, the $p(2 \times 2)$ phase is replaced by the phases consisted of zigzag chains with local periodicity: $c(3 \times 3)$, $c(5 \times 2)$ and $c(6 \times 2)$ (Fig.1c). At saturation of chemisorbed coverage, ordered bright zig-zag chains appear on the surface, as seen from STM image in Fig. 1d. These new features have been explained by the iodine induced shifted-row reconstruction [2] of the Ni(100) surface. Bright zig-zag chains are formed by iodine atoms adsorbed in the new nearly three-fold positions on the both sides of the shifted nickel row (see model in Fig.1e). Further iodine dosing leads to the nucleation and growth of 2D nickel iodide islands.

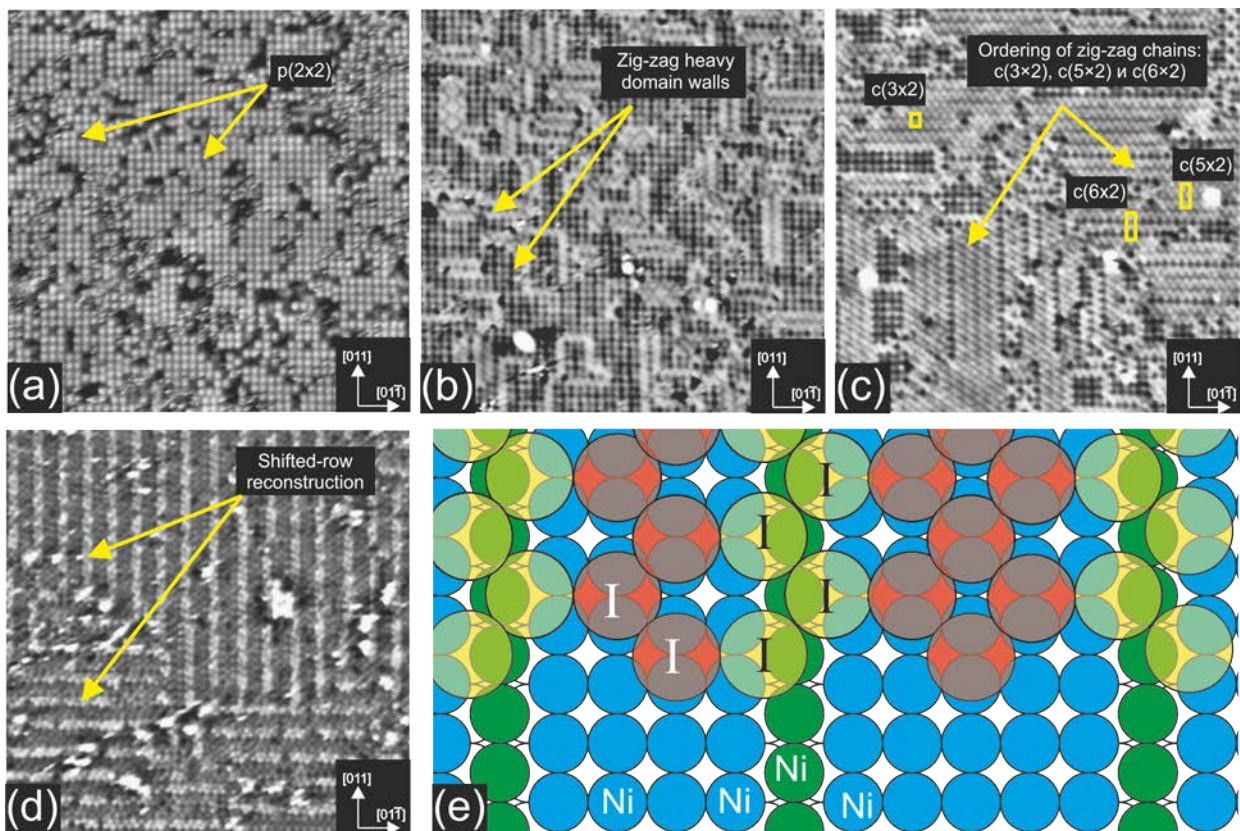


Fig.1

References:

- [1] R.G.Jones, Prog. Surf. Sci. 27, 25 (1988)
- [2] M. Schmid, A. Biedermann, S.D. Biihmig, P. Weigand, P. Varga, Surf. Sci. 318, 289 (1994)