

Frigge *et al.* Reply: Shim, Yeo, Lee, and Kim [1] claim that our finding that adsorbates facilitate the charge density wave (CDW) formation in indium wires on Si(111) is not substantiated and that the role of the adsorbates observed in our study [2] is inconsistent with previous findings.

They conclude from our measurements of the transient (8×2) -diffraction spot intensity [Fig. 3(a) in Ref. [2]] that only a fraction of the (8×2) area is turned into the (4×1) phase upon laser excitation and that this fraction decreases with increasing sample age. In fact, the presentation of the diffraction spot intensities in our work [2] is misleading. To clarify the actual intensity change, Fig. 1 shows line profiles through an (8×2) spot and a twofold streak for the least aged surface. Profiles were taken prior to and shortly after excitation. Spots and streaks have completely vanished, indicating that the complete probed area is transformed from (8×2) to (4×1) . The magnitude of the intensity drop and its reduction with increasing sample age as seemingly evident from Fig. 3(a) in Ref. [2] is an artifact of the data analysis and of the experimental temporal resolution of 30 ps [3]. The transient spot intensity is convoluted with the temporal resolution. This leads to a washing out of the observed intensity drop that is more pronounced for short recovery time constants. Therefore, we cannot reliably determine any fraction of remnant (8×2) regions. We want to stress that the conclusions in Ref. [2] are solely based on the measured time constants that are not affected by the above described limitations.

We agree that part of the (8×2) reconstruction must remain unaffected by the laser excitation. Otherwise—as correctly stated by Shim *et al.* [1]—the long-range order of the eightfold periodicity would be destroyed during freezing and no sharp eightfold spots would be observed. Thus, the refreezing front must propagate from boundaries between remnant (8×2) and (4×1) regions. The observed dependence of the (8×2) spot recovery time constant on the aging of the sample [2] is evidence that the area with remnants of (8×2) is linked to the presence of adsorbates.

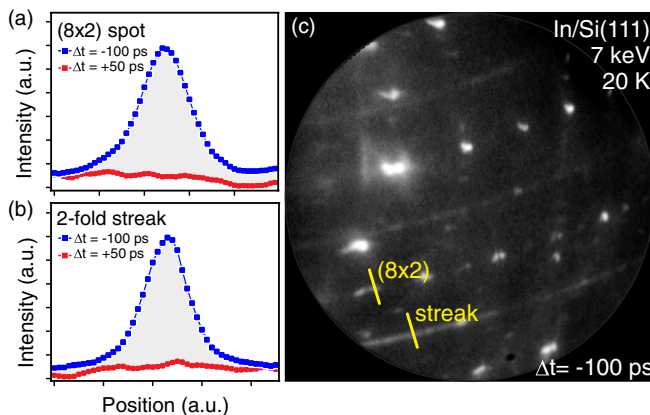


FIG. 1 (color online). Line scans through an (a) (8×2) -diffraction spot and a (b) twofold streak taken prior to (-100 ps) and shortly after excitation ($+50$ ps). In the diffraction pattern (c), the regions where the line scans have been taken are indicated.

Another issue in Ref. [1] concerns the nature of the adsorbates and their influence on the phase transition temperature. As we investigated the adsorption from residual gas we could not identify the adsorbate that triggers the phase transition. We agree that water is the most likely molecule to adsorb at the sample surface. In a low-energy electron diffraction study [4], we confirm the finding in Ref. [1] that water is unlikely to change the critical temperature. However, the surface is excited by fs laser pulses at a fluence of 2.1 mJ/cm^2 . Whereas the influence of laser excitation on adsorbed water is unknown, we cannot exclude a photodissociation process that releases atomic oxygen that has been found to increase the critical temperature [1,5,6].

In conclusion, there are still open questions concerning the influence of specific adsorbates on the CDW formation and the critical temperature. However, we are certain that the major findings in Ref. [2] are well substantiated. These findings do not interfere with the fact that remnant (8×2) regions surrounding the adsorbates [1] act as condensation nuclei triggering the freezing of the CDW subsequent to laser excitation.

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