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Novel plastic processes in nanoindented stepped Au surfaces VIOLETA NAVARRO, OSCAR RODRIGUEZ DE LA FUENTE, ARANTZAZU MASCARAQUE, JUAN MANUEL ROJO, Univ. Complutense de Madrid, 28040 — While much work has been done recently on defect nucleation during plastic processes, mechanical properties of real surfaces have been seldom studied atomistically. Defect nucleation is well known to be critical in the mechanical behaviour of materials [1]. But the role that surface defects play on the earliest stages of plasticity still needs to be elucidated. We approach realistic surfaces by using vicinal surfaces with a high step density. Nanoindentations with AFM and atomistic simulations have been performed on the Au(788) surface [2]. Force vs penetration curves show a hertzian initial stage and a later incipient plastic regime when dislocations are nucleated. Between these two regimes we report a novel one, in which dislocations nucleate at the steps but no pop-ins are visible. This novel regime is to a large extent reversible in the sense that defects disappear when the tip is retracted [2]. Heterogeneous dislocation nucleation is catalyzed by the presence of the surface steps.

[1] J. Li, MRS Bulletin, 32, (2007), 151.

[2] V. Navarro et al. Submitted

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