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Abstract

Mechanical surface treatments based on repeated impacts are known to create a graded strengthening in-depth by the means of severe plastic deformation. However microstructural evolution mechanisms leading local progressive grain refinement and the resulting surface mechanical hardening are not yet fully understood. It is shown in this paper that micro-percussion testing represents an interesting case scenario to emulate conventional treatments such as shot peening and better characterize microstructural changes at local and global scales. For this technique, every impact is made at the same position by a rigid conical indenter, controlling the number, angle and velocity of each impact. The main issue of this work is : (*i*) to describe the transformed microstructures by the means of SEM microscopy and EBSD mapping; (*ii*) to quantify the mechanical gradient in-depth using the micro-pillar compression testing; (*iii*) to converge both descriptions to understand the mechanisms involved on the