# Template for ILAS 2020 abstracts
# Functionalised polycrystalline boron nitride materials through laser surface engineering

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Polycrystalline boron nitride cutting tools are widely used for hard-part steel turning due to their high wear resistance and long durability, however microstructurally different boron nitride composites are suited for different machining applications. Using a nanosecond fibre laser (1064-nm wavelength) surface engineering of polycrystalline boron nitride materials is proposed to change their mechanical properties and enable to extend the applicability of a specific grade to a variety of applications. The materials' response to different fluences, feed speeds and pulse durations was investigated and characterised through a combination of 3D white light interferometry, scanning electron microscopy (SEM) and micro-hardness measurements. 3D metrological data (Sa, Spk, Sku and Sq) of the samples were measured prior and post-process to provide an indication of the change in wear properties. Fractures between hard grains and binder and reduced surface integrity were highlighted by SEM analyses due to compressive stresses caused by a difference in thermodynamic properties between grains and binder. Increased frequency and energy density caused local heating corroborated by larger Sa, Spk and Sq values but lower Sku values. Micro-hardness measurements revealed up to 20% increased hardness and 10% decreased root mean square height (Sq) with reduced feed speed and energy density per pulse.