令和元年 6 月 1 日

応用物理学会北海道支部
会員各位

応用物理学会北海道支部

講演会のお知らせ

下記講演会を開催いたしますので、多数ご参加下さいますようご案内申し上げます。

演題：Spatially Resolved Acoustic Spectroscopy (SRAS): an NDE Technique for Materials Characterisation Based on Laser Ultrasonics
講師：Wenqi Li 氏
（Optics and Photonics Group, Faculty of Engineering, University of Nottingham, Senior Research Fellow）
日時：令和元年 6 月 18 日（火）　15:00～16:00
場所：北海道大学工学部応用物理学専攻会議室（A3-62）
主催：応用物理学会北海道支部

講演の要旨

Material characteristics such as strength, stiffness and fracture resistance are strongly related to the underlying microstructure. In order to predict the mechanical behaviour of industrial materials such as titanium, nickel and their alloys - made by conventional techniques or additive manufacturing -detailed knowledge about their texture is required. A robust measurement tool is introduced which can be used to determine texture, grain orientation and surface and sub-surface defects of a material. This is achieved by using a laser ultrasonic technique known as spatially resolved acoustic spectroscopy (SRAS). In SRAS, a SAW excitation pattern is generated by projecting a grating pattern of laser light. By using a broadband laser in combination with a fixed grating, the local velocity v can be calculated through $v = f\lambda$, where f is the frequency of the detected signal and λ is the grating period. The velocity map measured by SRAS reveals the grain size and texture of a material. For crystallographic orientation determination, a SAW velocity model is calculated from the material's elastic constants and mass density; a search algorithm, termed the overlap function, is used to compare the SRAS data to the model to determine the crystallographic orientation. Beside the above, surface and sub-surface defects, as well as other information can also be extracted from the SAW velocity. We examined a range of materials commonly used in the performance engineering industry. Comparisons between SRAS and other techniques, including electron backscattered diffraction and X-ray diffraction, are presented. This is an innovative and all-purpose NDE technique for materials manufacture monitoring and quality control.

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