YNU 横浜国立大学
YOKOHAMA National University

物理工学談話会　４月２６日（木）午後１５：００～

会場：総合研究棟Ｗ７０１　世話人：レービガー　ハンネス

何方でも気楽にご参加ください

Semiconductors, devices and interfaces: what can we tell with positrons?

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Charge localization (trapping) phenomena in semiconducting and insulating crystalline solids are central to the function of all present and future electronic devices. Whether we discuss micro-processors, fast power switches, light-emitting devices (LEDs) or photovoltaics, the fundamental challenges are the same: how, where and why are the charge carriers (*i*) generated in or injected into the device, (*ii*) transferred through the relevant parts device and eventually collected in some other part, and (*iii*) trapped while, before or after being transferred. Positron annihilation spectroscopy is a well-established method for studying point defects, in particular vacancies, in semiconductors and insulators [1]. Theory predicts a certain kind of sensitivity also to interfaces between semiconducting materials [2].

I will first give a brief introduction to state-of-the-art positron annihilation experiments and how to efficiently employ theoretical calculations in interpreting the results for vacancy-type defects. Then I will discuss three recent examples of experiments, where positrons are used for analyzing small impurity atoms in GaN [3], alloy disorder in InGaN alloys [4], and interface traps in GaN/AlGaN high electron mobility transistors (HEMTs) [5].

References

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[2] I. Makkonen *et al.*, Phys. Rev. B **82**, 041307(R) (2010).
[3] F. Tuomisto *et al.*, Phys. Rev. Lett. **119**, 196404 (2017).
[4] V. Prozheeva *et al.*, Appl. Phys. Lett. **110**, 132104 (2017).
[5] V. Prozheeva *et al.*, in preparation.