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Point defects in nitride-based semiconductors studied by positron annihilation spectroscopy

Prof. Akira Uedono

时间：11月22日（星期四）15:00—16:40

地点：北京大学物理大楼中212教室

Prof. AkiraUedono: Akira Uedono is a Professor in Division of Applied Physics, Faculty of Pure and Applied Science, University of Tsukuba, Japan. He earned his Ph.D. in material sciences at the Institute of Materials Science, University of Tsukuba, 1989. He has been research associate at Yokohama City University and University of Tokyo. His research is mainly focused on defects and atomic scale disorder in solids. His work aims at the development of positron annihilation technique for material characterization and its application for semiconductor technology and other field.

Abstract: Positron annihilation is a non-destructive tool for investigating vacancy-type defects in materials. With this technique, detectable defects are monovacancy to open pore (<100 nm3). The detection efficiency is high (>1015 cm̃3 for a monovacancy), and there is no restriction of sample temperature or conductivity. Using monoenergetic positron beams, detection of defects in subsurface region (0~1m) is also possible. Vacancy-type defects in group-III nitride semiconductors have been investigated using this method, and the results show that positrons are a powerful probe for studying cation vacancies, vacancy clusters, and vacancy-impurity complexes. In the present study, we studied native defects in AlGaN and InGaN. For Si-doped AlGaN, a correlation between the optical properties and the defect concentration was obtained, suggesting the cation vacancies act as nonradiative centers in AlGaN. The characterization of InGaN and the difference in the defect introduction mechanism of AlGaN and InGaN will be also discussed.

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