

固体電子工学研究室 1

1) 当該研究室の研究成果について

(*) Excellent () Very Good () Good () Fair () Poor

材料創製ならびに分析科学をベースとしたトップレベルの研究開発成果を継続的に発信している。特に GOS 技術の提案とデバイス実証に関する研究開発業績は特筆するものがある。また産学連携を基軸としたデバイス評価技術の優位性実証でも、アカデミアとして特徴ある研究成果を発信している。

2) 当該研究室構成員の学会活動について

() Excellent (*) Very Good () Good () Fair () Poor

評価期間が研究室主宰教授の退職時期と重なった事を考慮すれば、研究室全体として十二分に学会活動に貢献していると判断できる。

3) 当該研究室構成員の社会貢献について

() Excellent (*) Very Good () Good () Fair () Poor

産学連携研究でも成果をあげており、民間企業への技術指導にも積極的に取り組んでいる。

4) 当該研究室の競争的資金の獲得状況について

() Excellent (*) Very Good () Good () Fair () Poor

当該研究室構成員を研究代表者とする大型予算の獲得例は限定的であるが、主宰教授の退職があった事を考えれば、十分な成果をあげていると言える。

5) 国際共同研究・連携研究・連携教育活動の実績について

() Excellent () Very Good (*) Good () Fair () Poor

着実な国際連携を推進しているが、今後の更なる発展が望まれる。

6) 共同利用・共同研究拠点活動の実績について

(*) Excellent () Very Good () Good () Fair () Poor

材料分析や反応解析、さらにはデバイス試作に際して共同利用施設を有効に活用した研究開発を展開している。また、これらの活動に民間企業を参画させている事も特筆すべき成果である。

7) その他、総合的なコメント

評価期間中に主宰教授の退職があったが、構成員（准教授）が継続的な研究成果発信を行っている判断できる。

固体電子工学研究室 2

1) 当該研究室の研究成果について

(*) Excellent () Very Good () Good () Fair () Poor

SiC、および二次元電子系（グラフェンなど）について表面化学としての基礎をしっかりと構築した上で結晶成長、物性制御を行い、さらに超高速・省エネ電子デバイスの開発まで行っており、多くの招待講演を行うなど国際的に評価の高い成果を挙げている。

2) 当該研究室構成員の学会活動について

() Excellent (*) Very Good () Good () Fair () Poor

応用物理学会を主な活躍の場とし、他にも物理学会、表面科学会、放射光学会などで数多くの招待講演を行うとともに、重要な学会役員、国際会議の委員などを務め、学会運営にも貢献している。

3) 当該研究室構成員の社会貢献について

() Excellent () Very Good (*) Good () Fair () Poor

高校での授業、産業界との共同研究などを行っているが、アウトリーチ活動がやや少ない。しかし、研究成果の新聞発表を8件行っており、社会的にもインパクトが大きい成果を挙げている。

4) 当該研究室の競争的資金の獲得状況について

() Excellent (*) Very Good () Good () Fair () Poor

科研費、JST、NEDO、総務省 SCOPE、民間共同研究などさまざまな外部資金を獲得し、実験装置の更新や研究活動に当てているが、分担者が多い点がやや気になる。次のステージでは代表者として大型予算の獲得をめざしてほしい。

5) 国際共同研究・連携研究・連携教育活動の実績について

() Excellent () Very Good (*) Good () Fair () Poor

2件の国際共同研究を行っているが、いずれも客員教授として通研に招聘したケースである。大きな成果を挙げているので、国際共同論文（今期では約1割）がもう少し増えてもいいのでは、と思われる。

6) 共同利用・共同研究拠点活動の実績について

() Excellent (*) Very Good () Good () Fair () Poor

民間共同研究、特に住友電工と信越化学の共同研究において大きな成果を挙げている。

7) その他、総合的なコメント

本固体電子工学研究室は物理学・電子工学を専門とする教授と表面化学・応用物理を専門とする准教授が巧みに補い合って二次元電子系の結晶成長、表面物性、高速電子デバイスの研究を行っており、この分野において優れた研究成果を生み出し続けている。活発な民間共同研究を通じて新しい研究資金獲得につなげており、研究室運営も順調に行われている。

固体電子工学研究室 3

1. How would you evaluate the research activities in this period?

(*) Excellent () Very Good () Good () Fair () Poor

Research activities in the Laboratory of Solid State Electronics at RIEC show achievements at the highest level in the reporting period 2013 - 2018. The discovery of Suemitsu and Fukidome of graphene growth on SiC deposited on silicon has paved the way towards using graphene, as a material with extreme mobility and other advantageous properties, in the evolving "Beyond CMOS" technology. Providing silicon as substrate offers the great advantage of using existing methodologies for device fabrication. Other achievements are the development of operando spectromicroscopy at synchrotron radiation beamlines to characterize electronic states and potential distribution at semiconductor interfaces, including operating field effect transistors and other devices. The very high level of research achievement is documents by a large number of publications, many of which were published in prestigious journals such as Scientific Reports, Applied Physics Letters, Physical Review B, Carbon, 2D Materials etc. . This track record is particularly impressive given the small number of researchers in the group.

2. How would you evaluate the activities of the members in the laboratory for the academic societies?

(*) Excellent () Very Good () Good () Fair () Poor

Professors Suemitsu and Fukidome have been very active in academic societies, both nationally and internationally. They have chaired chapters and divisions of the Japanese Society of Applied Physics, have taken part in organizing international conferences, and have been active as reviewers and associated editors of prestigious journals. Their work has been recognized by several awards.

3. How would you evaluate the contribution of the laboratory to society?

(*) Excellent () Very Good () Good () Fair () Poor

Professors Suemitsu and Fukidome have lectured at high schools to advanced students, and to researchers in industry; they have also been active in dissemination of their work in the public media. This part of their contribution to society is "very good". However, their response to this question ("contribution of the laboratory to society") is a bit narrow. I believe that their contribution to society is extremely important and "excellent" in the sense that the work on graphene epitaxy on SiC/Si may have long term repercussions for information and communication technology across society.

4. How would you evaluate the lab's level of funding?

(*) Excellent () Very Good () Good () Fair () Poor

The group have received, over the reporting period, a large number of grants, e.g. for epitaxial growth of graphene, THz laser development, and last but not least for developing operando spectromicroscopy. The NEDO project for commercialization of GFETS must also be mentioned here. The two grants from industry are most important since they underline the importance of work at the Laboratory of Solid State Electronics for industrial applications. Recently acquired funding relates to operando spectromicroscopy of biological systems and the growth of stacks of 2D van der Waals materials shows promise for exciting work.

5. How would you evaluate the lab's collaborative research, including international joint research and collaborative education?

Excellent Very Good Good Fair Poor

Several collaborations with groups and institutions across Japan are in place; cooperations with Prof. Filimonov and other international researchers have led to joint publications. Efforts have been made to involve foreign students, for example from Korea.

6. RIEC is one of Japan's "Joint usage/Research Center" or "Nation-wide Cooperative Research Projects" institutes. How would you evaluate the achievements of work done under this framework?

Excellent Very Good Good Fair Poor

Work performed under the Joint Usage scheme has led to several important collaborations, for example with Sumitomo Electric Industries and ShinEtsu Chemicals, a clear sign that the group is making excellent use of the scheme. These collaborations have also led to a large number of patents being submitted, a healthy sign of the applied nature of their research and of important progress. An industrial/academia/government alliance has emerged from the joint usage/Research Center. This alliance has resulted in the continued funding of the SCOPE project for advanced device development – an excellent benchmark for the successful work in the laboratory. The involvement of Prof. Fukidome in defining and designing of equipment for the planned synchrotron radiation source to be constructed on the campus of Tohoku University is a most important development, given his recent successful work in operando spectromicroscopy.

7. Additional or overall comments

In summary, all aspects of work at the Laboratory of Solid State Electronics of RIEC demonstrate an excellent level of scientific achievement. There is ample promise for continued successful work in the future.