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論　文　内　容　要　旨

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学位論文題目	Graphene stacked junction diode for terahertz emission (テラヘルツ放出グラフェン積層接合ダイオード)		

Graphene is one of the most prosperous materials for diode in terahertz emission, the properties of graphene in terahertz technology promise in enabling novel technologies for the convergence of electronics and photonics. Owing to the recent development of heterostructure fabrication technology using materials composed of two-dimensional atomic crystals, creation of new functional devices consisting of graphene tunnel diodes has become possible.

In this thesis, sandwiched stacked graphene junction diode structure composed of graphene/ structured water/ graphene was fabricated using a direct bonding technology. The epitaxial graphene samples were prepared on a 4H-SiC (0001) semi-insulative substrate with dimensions of 10 mm × 10 mm using an infrared rapid thermal annealer (SR-1800). The Hall effect, Raman and Scanning probe microscope (SPM) measurement are used for graphene samples to know graphene surface condition. The water layer structure is fabrication though treated in DI water for 15 min that to cover it with an atomically thin structured water layer as barrier. We successful got 4 stacked graphene junction diodes both the Fowler–Nordheim (FN) phenomena and Direct tunneling (DT) phenomena are observed. We demonstrated and analyze graphene/ structured water/ graphene junction diode though Current–Voltage (*I-V*) characteristics and Fowler–Nordheim tunneling(FNT) tunneling model for parameters calculation. Based on FN-plot junction diode data analysis, the thickness of water layer barrier of graphene junction diode is obtained less than 1nm. This very thin barrier provides possible for high current and large power graphene junction diode.