As 가스로 표면처리된 InP에서의 InAs 형성
(InAs formation for surface treated InP with Arsenic Gas)

한국전자통신연구소 : 박 형호, 유 지범, 김 정수, 곽 병화, 김 상기
이 희태, 오 대곤, 권 오준, 이 용탁
한국과학기술원 : 이 정용

InP and related compound semiconductors have received considerable attention because of the application of optoelectronic devices in fiber-optic communications. Optoelectronic devices are fabricated in various structures many of which consist of fairly thin layers. Interfaces in various structures are generally believed to play an important role in the performance of devices. Growth interrupt under different ambient gas and with different time interval has been employed as one of techniques to improve the interface quality. But not much of effects of different ambient gas on the semiconductor surface during growth interrupt is revealed.

The surface passivation of InP has been intensively studied to fabricate metal semiconductor field effect transistor(MESFET) of high performance. It has been reported that As treatment can passivate the InP surface and improve the device performance [1-3]. But reaction between As and InP has not been fully investigated. Understanding of effects for gas molecule on InP can provide the efficient method for growth interrupt as well as the passivation of InP substrate.

SPIRE MOCVD 450 with cold wall barrel type quartz reactor and graphite susceptor heated by RF power generator was used. For growth of InP on InP substrate supplied by Sumintomo Co. (Japan), we used TMIn and PH_3 as source materials and palladium diffused H_2 as a carrier gas. InP epitaxial layer was grown at 600

°C and 76Torr. After growth of InP epitaxial layer, mixture of PH_3 and AsH_3 was introduced and maintained for 10min at 650° C.

The dendritic growth of InAs was confirmed and analyzed using XRD, SEM, TEM, XPS and SIMS. Scores of μm InAs and substrate InP were found to have a coaxial <001> and orientation relationship as (220)InAs//(220)InP with misorientation of about 4 °. Arsenic gas treatment seemed to induce the decomposition of InP and formation of InAs. The phosporous produced from the decomposition of InP was observed to evaporate.

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