

## Journal and Letters

### Mg<sub>2</sub>Si<sub>1-x</sub>Ge<sub>x</sub> compound semiconductors

1. Y. Noda, H. Kon, Y. Furukawa, N. Otsuka, I. Nishida, and K. Masumoto, "Preparation and thermoelectric properties of Mg<sub>2</sub>Si<sub>1-x</sub>Ge<sub>x</sub> (x=0.0~0.4) solid solution semiconductors," *Materials Transactions, JIM* 33 (1992) 845-850.

### Opto-Electronic Integrated circuit

2. K. Matsuda, M. Kubo, N. Otsuka, and J. Shibata, "Limitation factor of the bandwidth for InGaAs/InP monolithic photoreceiver," *J. Lightwave Technology* 7 (1989) 2059-2063.

### InP MOVPE growth

3. N. Otsuka, M. Ishino, and Y. Matsui, "Stability of Zn doping profile in modulation doped multiple quantum well structure," *J. Appl. Phys.* 80 (1996) 1405-1413.
4. N. Otsuka, M. Ishino, and Y. Matsui, F. Toujou "Control of double diffusion front unintentionally penetrated from a Zn doped InP layer during metalorganic vapor phase epitaxy," *J. Appl. Phys.* 84 (1998) 4239-4247.
5. Y. Yabuuchi, Y. Takahashi, N. Ohtsuka, T. Isshiki, M. Tsujikura, H. Saijo, and M. Shiojiri, "High-Resolution Transmission Electron Microscopy Observations of InGaAs/InP Multilayer Heterostructures," *Phys. Stat. Sol. (a)* 127 (1991) 385-396.
6. M. Shiojiri, T. Isshiki, K. Nishino, M. Tsujikura, J. Saijo, Y. Takahashi, N. Ohtsuka, and Y. Yabuuchi, "Quantitative Structure Images of Interfaces in InGaAs/InP Multilayer Heterostructures," *J. Electron Microscop. and Ultramicroscopy* 41 (1992) 434-444.

### InP DFB lasers, InP strained MQW lasers

7. N. Otsuka, M. Kito, Y. Mori, M. Ishino, and Y. Matsui, "New structure by selective regrowth in multi-quantum well laser diodes performed by low pressure metalorganic vapor phase epitaxy," *Journal of Crystal Growth* 145 (1994) 866-874.
8. N. Otsuka, M. Kito, Y. Yabuuchi, M. Ishino, and Y. Matsui, "Degradation of PL characteristics in strained layer multi-quantum well structure with atomic ordering structure," *Journal of Electronic Materials* 25 (1996) 701-708.
9. N. Otsuka, M. Kito, M. Ishino, and Y. Matsui, "1.5 μm strained-layer MQW-DFB lasers with high relaxation oscillation frequency and low chirp characteristics," *IEEE J. Quantum Electron* 32 (1996) 1230-1236.
10. N. Otsuka, M. Kito, Y. Yabuuchi, M. Ishino, and Y. Matsui, "Anomalous temperature dependence of PL characteristics in ordered InGaAsP strained layer multi-quantum well structure," *Journal of Crystal Growth* 170 (1997) 626-633.
11. M. Kito, M. Ishino, N. Otsuka, N. Hoshino, K. Fujihara, K. Fujito, and Y. Matsui, "Low distortion up to 2 GHz in 1.55 μm multi-quantum well distributed-feedback laser," *Electron. Lett.* 28 (1992) 891-892.
12. M. Kito, N. Otsuka, M. Ishino, K. Fujihara, and Y. Matsui, "Enhancement relaxation oscillation frequency of 1.3 μm strained-layer multi-quantum well lasers," *IEEE Photon. Technol. Lett.* 6 (1994) 690-693.

13. M. Kito, H. Sato, N. Otsuka, N. Takenaka, M. Ishino, and Y. Matsui, "Analysis of the second- and third-order intermodulation distortion in DFB lasers including dynamic spatial hole burning effect," *IEEE Photon. Technol. Lett.* 7 (1995) 144-146.
14. M. Kito, N. Otsuka, M. Ishino, and Y. Matsui, "Barrier composition dependence of differential gain and external differential quantum efficiency in 1.3- $\mu\text{m}$  strained-layer multi-quantum-well lasers," *IEEE J. Quantum Electron.* 32 (1996) 38-42.
15. M. Kito, S. Nakamura, N. Otsuka, M. Ishino and Y. Matsui, "New structure of 1.3  $\mu\text{m}$  strained-layer multi-quantum well complex-coupled distributed feedback lasers," *Jpn. J. Appl. Phys.* 35 (1996) 1375-1377.
16. M. Kito, S. Kimura, N. Otsuka, K. Fujihara, M. Ishino, and Y. Matsui, "High output power operation of 1.3  $\mu\text{m}$  strained MQW lasers with low threshold currents at high temperature," *Optical and Quantum Electron.* 28 (1996) 503-511.
17. M. Kito, N. Otsuka, S. Nakamura, M. Ishino, and Y. Matsui, "High-power, wide-temperature range operation of 1.3  $\mu\text{m}$  gain-coupled DFB lasers with automatically buried InAsP absorptive grating," *IEEE Photon. Technol. Lett.* 8 (1996) 1299-1301.
18. M. Ishino, N. Takanaka, M. Kito, K. Fujihara, N. Otsuka, K. Fujito, and Y. Matsui, "Low distortion 1.3  $\mu\text{m}$  strained-layer MQW-DFB laser for AM-SCM transmission systems with large channel capacity," *J. Lightwave Technol.* 15 (1997) 2172-2178.

#### **InP Self-limiting Etching**

19. N. Otsuka, Y. Oyama, H. Kikuchi, J. Nishizawa, and K. Suto, "Digital etching of (001) InP substrate by intermittent injection of tertiarybutylphosphine in ultrahigh vacuum," *Jpn. J. Appl Phys.* 37 (1998) L1509-L1512
20. N. Otsuka, J. Nishizawa, Y. Oyama, H. Kikuchi, and K. Suto, "Digital etching of InP by intermittent injection of tris-dimethylaminophosphorus in ultra high vacuum," *J. Electrochem. Soc.* 146 (1999) 547-550.
21. N. Otsuka, J. Nishizawa, Y. Oyama, H. Kikuchi, and K. Suto, "Digital Etching of InP by Intermittent Injection of Phosphorous Precursors in Ultra-high Vacuum," *Jpn. J. Appl Phys.* 38 (1999) 2529-2537.
22. N. Otsuka, J. Nishizawa, Y. Oyama, H. Kikuchi, and K. Suto, "Self-limiting etching prior to self-limiting growth in ultra-high vacuum for obtaining clean interface," *International Conference for The Physics of Semiconductors* (2001) .

#### **InP Molecular Layer Epitaxy**

23. N. Otsuka, J. Nishizawa, H. Kikuchi, and Y. Oyama, "Self-Limiting Growth of Specular InP Layer by Alternate Injection of Triethylindium and Tertiarybutylphosphine in Ultrahigh Vacuum," *Jpn. J. Appl Phys.* 38 (1999) L20-L23.
24. N. Otsuka, J. Nishizawa, H. Kikuchi, and Y. Oyama, "Self-limiting submonolayer growth of InP by alternative triethylindium and tertiarybutylphosphine supply in ultra high vacuum," *Inst. Phys. Conf. Ser* 162 (1999) 529-534.

25. N. Otsuka, J. Nishizawa, H. Kikuchi, and Y. Oyama, "Self-limiting growth of InP by alternate trimethylindium and tertiarybutylphosphine supply in ultrahigh vacuum," J. Crystal Growth 205 (1999) 253-263.
26. N. Otsuka, J. Nishizawa, H. Kikuchi, and Y. Oyama, "Self-limiting Growth Conditions on (001) InP by Alternate Triethylindium and Tertiarybutylphosphine Supply in Ultrahigh Vacuum," J. Vac. Sci. Technol. A17 (1999) 3008-3018.
27. N. Otsuka, J. Nishizawa, H. Kikuchi, and Y. Oyama, "Expanded self-limiting growth condition of InP by alternate trimethylindium and tertiarybutylphosphine supply in ultrahigh vacuum," J. Crystal Growth 209 (2000) 252-257.

#### **GaN Blue Laser Diodes and Ultraviolet Light-Emitting Diodes**

28. N. Otsuka, A. Tsujimura, Y. Hasegawa, G. Sugahara, M. Kume, and Y. Ban "Room Temperature 339 nm Emission from  $\text{Al}_{0.13}\text{Ga}_{0.87}\text{N}/\text{Al}_{0.10}\text{Ga}_{0.90}\text{N}$  Double Heterostructure Light-Emitting Diode on Sapphire Substrate", Jpn. J. Appl. Phys, 39 (2000) L445.
29. N. Otsuka, A. Tsujimura, Y. Hasegawa, G. Sugahara, M. Kume, and Y. Ban "339 nm Deep-UV Emission from  $\text{Al}_{0.13}\text{Ga}_{0.87}\text{N}/\text{Al}_{0.10}\text{Ga}_{0.90}\text{N}$  Double Heterostructure Light-Emitting Diode on Sapphire Substrate", Proc. Int. Workshop on Nitride Semiconductors, IPAP Conf.. Series 1 (2000) 837-840.
30. A. Tsujimura, A. Ishibashi, Y. Hasegawa, S. Kamiyama, I. Kidoguchi, N. Otsuka, R. Miyanaga, G. Sugahara, M. Suzuki, M. Kume, K. Harafuji, and Y. Ban, "Room-temperature CW operation of GaInN multiple quantum well laser diodes with optimized indium content," Phys. Status Solidi A **176** (1999) 53-57.
31. K. Harafuji, Y. Hasegawa, A. Ishibashi, A. Tsujimura, N. Otsuka, I. Kidoguchi, and Y. Ban "Complex Flow and Gas Phase Chemical Reactions in GaN MOVPE Reactor", Proc. Int. Workshop on Nitride Semiconductors, IPAP Conf.. Series 1 (2000) 101-104.

#### **GaN Power Diodes, GaN MMICs**

32. N. Otsuka, S. Nagai, M. Yanagihara, U. Uemoto and D. Ueda "Low-Pressure Direct-Liquid-Cooling Technology for GaN Power Transistors ", Jpn. J. Appl. Phys, 50 (2011) 04DF07.
33. N. Otsuka, S. Nagai, H. Ishida, Y. Uemoto T. Ueda, T. Tanaka, and D. Ueda "GaN Power Electron Devices", ECS Transactions, 41 (8) (2011) 51-70.
34. 大塚信之、永井秀一、上田大助 「第4章 パワーデバイスパッケージング技術」サイエンス&テクノロジー, 2012, 239-262.
35. S.Nagaia, Y.Yamadaa, Y. Kawaia, N. Negorob, H. Handab, M.Hiraiwaa, H.Uenoa, Y.Kudoha, K.Mizutania, M.Ishidab, T.Uedab, N.Otsuka, and D. Ueda "An Ultra Compact GaN 3x3 Matrix Converter", ECS Transactions, 64 (7) 41-49 (2014)
36. Shuichi Nagai; Yasuhiro Yamada; Noboru Negoro; Hiroyuki Handa; Miori Hiraiwa; Nobuyuki Otsuka; Daisuke Ueda, "A 3-Phase AC-AC Matrix Converter GaN Chipset With Drive-by-Microwave Technology" , IEEE Journal of the Electron Devices Society, 3 (1) 7-14 (2015).

37. Toshihide Ide, Mitsuaki Shimizu, Xu-Qiang Shen, Tatsuo Morita, Nobuyuki Otsuka, Tetsuzo Ueda “High accuracy equivalent circuit model for GaN GIT bi-directional switch”, *Physica Status Solidi C*, Volume 13 (5-6) 378–381 (2016).
38. . Asamira Suzuki, Songbeak Choe, Yasuhiro Yamada, Nobuyuki Otsuka and Daisuke Ueda, “NiO gate GaN-based enhancement-mode heterojunction field-effect transistor with extremely low on-resistance using metal organic chemical vapor deposition regrown Ge-doped layer” , *Japanese Journal of Applied Physics*, 55 (12) 121001 (2016).