

6 Literatures

6.1 Applied literatures

1. BPA Consulting Ltd., „Worldwide market and technology trends for optical substrates and backplanes 2003-2010”, *BPA Report* no. 825, 2003.
2. Whitepaper: PCI Express Ethernet Networking. www.intel.com, date: 11.01.2007.
3. Miller, D A B., „Rationale and Challenges for Optical Interconnects to Electronic Chips”, *Proceedings of the IEEE* 88, Nr. 6, 2000, pp. 728-749.
4. Voges, E., Petermann, K. (Hrsg.), „Optische Kommunikationstechnik”, Springer-Verlag, 2002.
5. Bauer, J., Ebling, F., Schröder, H., „Verbindungstechnik New Generation“, *Elektronik Praxis*, 2005.
6. Huang, D, Sze, T, Landin, A, Lytel, R and Davidson, H L., „Optical Interconnects: Out of the Box Forever?”, *IEEE Journal of Selected Topics in Quantum Electronics*, Nr. 9, 2003, pp. 614-623.
7. Berger, C, Kossel, M A., Menolfi, C., Morf, T., Toifl, T. and Schmatz, M L., „High-density optical interconnects within large-scale systems”, *Proceedings of SPIE* 4942, 2003, pp. 222-235.
8. Kopetz, S., Rabe, E., Kang, W., and Neyer, A., „Polysiloxane optical waveguide layer integrated in printed circuit board”, *Electronics Letters* 40, Nr. 11, 2004, pp. 668-669.
9. Cai, D., Neyer, A., „Realization of Electrical-Optical-Circuit-Board self-packaging,” *Proceedings on 57th Electronic Components and Technology Conference, ECTC*, Reno, Nevada, USA, 2007, pp. 1368-1374.
10. Eldada L., „Polymer integrated optics: promise vs. practicality”, *Proc. Of SPIE* 4642, 2002, pp. 11-22.

11. Fa. Exxelis Ltd., Produktinformation Truemode Polymer, Internet: <http://www.exxelis.com/products/truemode.php>, 5.2.2007.
12. Bosman, E., Geerinck, P., Van Daele, P., „Optical connections on flexible substrates”, Proc. of SPIE, vol. 6185, 2006, pp. 60-67.
13. Wang, L., Wang, X, Chen, R.T., „Low-loss, thermally stable waveguide with 45° micromirrors fabricated by soft molding for fully embedded board-level optical interconnects”, Proc. of SPIE, vol. 5731, 2005, pp. 87-93.
14. Optical CrossLinks, Inc., „Multi-mode Circuit Board Components Optical Interconnections, Preliminary Product Brief”, Internet: <http://opticalcrosslinks.com>, 7.11.2006.
15. DeGroot, J.V., Glover, S.O., Dyer, M.J., „Polymeric Optical Interconnect for Chip-to-Chip Communication”, Proc. of the OFC 2005, Anaheim, USA, 2005, pp. OFD6.
16. Moynihan, M. et al., „Progress Towards Board-level Optical Interconnect Technology”, Proc. of SPIE, vol. 5731, Photonics Packaging and Integration, 2005, pp. 50-62.
17. Schröder, H. et al., „Temperaturstabile Wellenleiter und optische Kopplung für elektro-optische Leiterplatten”, Tagungsband der GMM/DVS-Tagung Elektrische Baugruppen, Aufbau und Fertigungstechnik, 2006, Fellbach, Deutschland.
18. Produktkatalog für micro resist technology Produkte. Internet: http://www.microresist.de/dl/booklet_d_lq.pdf, aufgerufen am 7.11.2006.
19. Kim, J.S., Kang, J.W., Kim, J.J., „Simple and Low Cost Fabrication of Thermally Stable Polymeric Multimode Waveguides using a UV-curable Epoxy”, Jpn. J. Appl. Phys., vol. 42, 2003, pp. 1277-1279.
20. Fa. Luvantix CO Ltd., Internet: <http://luvantix.com/specialty-EFIRON%20WR.htm>, Letztes Update 1.4.2003, 5.2.2007.
21. Lamprecht, T., Horst, F., Dangel, R., „Passive Alignment of Optical Elements in a Printed Circuit Board”, Proc. of the 56th Electronic Components and Technology Conference (ECTC), 2006, pp. 761-767.
22. Moisel, J., „Optische Backplanes für Avionik und Telekommunikation”, it - Information Technology, Vol. 45, No.2, 2003, pp. 72-78.

23. Su, K., DeGroot, J.V., Lo, P.Y., „Siloxane Materials for Optical Applications”, Proc. of SPIE, vol. 6029, 2006, pp. 318-325.
24. Graydon, O., „Photonics unlocks chip bandwidth bottleneck”, Opto & Laser Europe (OLE), Oct. 2004, pp. 25-27.
25. Choi, C., Lin, L., Chen, R.T., „Flexible Optical Waveguide Film Fabrications and Optoelectronic Devices Integration for Fully Embedded Board-Level Optical Interconnects”, IEEE Journal of Lightwave Technology, vol. 22, no. 9, 2004, pp. 2168-2176.
26. Ishii, Y., Koike, S., Ano, Y., „SMT-Compatible Large-Tolerance "OptoBump" Interface for Interchip Optical Interconnections”, IEEE Transactions on Advanced Packaging, vol. 26, no. 2, 2003, pp. 122-127.
27. Lee, E.H., Lee, S.G., Park, S.G., „Fabrication and integration of VLSI micro/nano-photonic circuit board”, Microelectronic Engineering, vol. 83, 2006, pp. 1767-1772.
28. Chen, Y.-M., Yang, C.-L., Cheng, Y.-L., „10 Gbps Multi-Mode Waveguide for Optical Interconnect”, Proc. of the 55th Electronic Components and Technology Conference (ECTC), 2005, pp. 1739-1743)
29. Schröder, H. et al., „Polymer Optical Interconnects for PCB”, Proc. of the IEEE int. Conf. on Polymers and Adhesives in Microelectronics and Photonics (Polytronic), Potsdam, Germany, 2001, pp. 337-343
30. Van Steenberge, G., Hendrickx, N., Van Daele, P., „Laser Ablation of Parallel Optical Interconnect Waveguides”, IEEE Photonics Technology Letters, vol. 18, No. 9, 2006, pp. 1106-1108.
31. Endo, Y., Fujimoto, K., Hirano, K., „Optical Wave Guide Inserted Opt-Electronic Circuit Board with High Design Possibility”, Hitachi Cable Review, no. 22, 2003, pp. 38-41.
32. Glebov, A. et al, „Optical Interconnect modules with fully integrated reflector mirrors”, IEEE Phot. Tech. Letters, vol. 17, 2005, p. 1540.
33. Chang, G.-K. et al., „Chip-to-Chip Optoelectronics SOP on Organic Boards or Packages”, IEEE Transactions on Advanced Packaging vol. 27, no.2, 2004, pp. 386-397.
34. Krabe, D. et al., „New Technology for Electrical/Optical Systems on Module and Board Level - The EOCB Approach -”, Proc. of the 50th IEEE ECTC, Las

Vegas, USA, 2004, pp. 970-974.

35. Kim, J.-S., Kim, J.-J., „Stacked Polymeric Multimode Waveguide Arrays for Two-Dimensional Optical Interconnects”, IEEE Journal of Lightwave Technology, vol. 22, No. 3, 2004, pp. 840-844.
36. Jokerst, N.M. et al., „Planar Lightwave Integrated Circuits With Embedded Actives for Board and Substrate Level Optical Signal Distribution”, IEEE Transactions on Advanced Packaging, vol. 27, no.2, 2004, pp. 376-385.
37. Kim, J.T., Choi, C.-G., „Integration of a polymeric planar-lightwave-circuit chip based on a polymer microsystem and a UV imprinting technique”, Journal of Micromechanics and Microengineering, vol. 15, 2005, pp. 1140-1146.
38. Uhlig, S., Fröhlich, L., Robertsson, M., „Polymer Optical Interconnects - A Scalable Large-Area Panel Processing Approach”, IEEE Transactions on Advanced Packaging, vol. 29, no. 1, 2006, pp. 158-170.
39. Immonen, M., Wu, J., Kivilahti, J., „Influence of Environmental Stresses on Board-Level Integrated Polymer Optics”, Proc. of the 55th Electronic Components and Technology Conference (ECTC), 2005, pp. 1653-1658.
40. Choi, C., Lin, L., Chen, R.T., „Flexible Optical Waveguide Film Fabrications and Optoelectronic Devices Integration for Fully Embedded Board-Level Optical Interconnects”, IEEE Journal of Lightwave Technology, vol. 22, no. 9, 2004, pp. 2168-2176.
41. Shen, L.-C., Lo, W.-C., Chang, H.-H., „Flexible Electronic-Optical Local Bus Modules to the Board-to-Board, Board-to-Chip, and Chip-to-Chip Optical Interconnection”, Proc. of the 55th Electronic Component and Technology Conference (ECTC), 2005, pp. 1039-1043.
42. Dasgupta, S. et al., „A Polymer Based Platform Technology for Integrated Photonics”, Proc. of SPIE, vol. 5517, 2004, pp. 134-140.
43. Kopetz, S., Technologie optischer Lagen für elektrisch-optische Leiterplatten, Universität Dortmund, Diss. 2007. – Published soon.
44. Rabe, E., Technologien großformatiger Replikationsformen für elektrisch-optische Schaltungsträger, Universität Dortmund, Diss. 2007. – Published soon.
45. Michalzik, R., „Fiber Optic Data Communication: Technological Trends and Advances”, Academic Press, 2002, pp. 216-269.

46. Neyer, A., Kopetz, S., Rabe, E., Kang, W., Tombrink, S., „Electrical-Optical Circuit Board Using Polysiloxane Optical Waveguide Layer”, *Proc. of the 55th IEEE Electronic Components and Technology Conference (ECTC)*, Orlando, Florida, 2005, pp. 246-250.
47. Kopetz, S., Cai, D., Rabe, E., Neyer, A., „PDMS-based optical waveguide layer for integration in electrical–optical circuit boards”, *Int. J. Electron. Commun. (AEÜ)*, vol. 61, 2007, pp. 163-167.
48. Groh, W., „Overtone absorption in macromolecules for polymer optical fibers,” *Makromol. Chem.* 189, 1988, pp. 2861-2874.
49. Tanio, N., Koike, Y., „What is the most transparent polymer?”, *Polymer Journal* 32, 2000, pp. 43-50.
50. Ballato, J., Foulger, S., Smith, D., „Optical properties of perfluorocyclobutyl polymers,” *J. Opt. Soc. Am. B* 20, 2003, pp. 1838-1843.
51. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical absorption in transparent PDMS materials applied for multimode waveguides fabrication”, *Optical materials*, in press.
52. Flipsen, T., Pennings A.J., and Hadziioannou, G., „Polymer optical fiber with high thermal stability and low optical losses based on novel densely crosslinked polycarbosiloxanes”, *J. Applied Polymer Science* 67, 1998, pp. 2223-2230.
53. Yasuda, N., Yamamoto, H., Minami, S., Nobutoki, H., Wada, Y., and Yanagia, S., „Novel silicone polymeric material with high thermal stability for optical waveguides”, *Jpn. J. Appl. Phys.* 41, 2002, pp. 624-630.
54. Usui, M., Hikita, M., Amano, T., Sugawara, S., Hayashida, S., Imamura, S., „Low-loss passive polymer optical waveguides with high environmental stability”, *Journal of Lightwave Technology* 14, 1996, pp. 2338 - 2343.
55. Kai, S., et al., „ Siloxane materials for optical applications”, *Proceedings of the SPIE* 6029, 2006, pp. 318-325.
56. Ma, H., Jen A., and Dalton, L., „Polymer-based optical waveguides: materials, processing, and devices”, *Advanced Materials* 14, 2002, pp. 1339-1365.
57. Conrady, A. E., „Applied Optics and Optical Design”, Dover, New York, 1960.
58. Herzberger, M., „Colour correction in optical systems and a new dispersion formula”, *Opt. Acta* 6, 1959, pp. 197-215.

59. Nakamura, S., Takasawa, N., and Koyamada, Y., „Comparison Between Finite-Difference Time-Domain Calculation With All Parameters of Sellmeier's Fitting Equation and Experimental Results for Slightly Chirped 12-fs Laser Pulse Propagation in a Silica Fiber", *J. Lightwave Technol.* 23, 2005, pp. 855-865.
60. Bekenstein, J. D., Schiffer, M., „Quantum Limitations of the Storage and Transmission of Information", *International Journal of Modern Physics C*, vol. 1, no. 4, 1990, pp. 355-422.
61. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „ Raman, infrared and visible spectroscopy of PDMS for characterization of polymer optical waveguide material", in preparation.
62. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical properties of polydimethylsiloxane (PDMS) used for optical waveguides", in preparation.
63. Siesler, H., et al., „Near-infrared Spectroscopy", Wiley-VCH, 2002.
64. Bokobza, L., Buffeteau, T., Desbat, B., „Mid- and Near-Infrared Investigation of Molecular Orientation in Elastomeric Networks", *Appl. Spectrosc.* 54, 2000, pp. 360 – 365.
65. Y. Xia and G. Whitesides, „Replica molding with a polysiloxane mold provides the patterned microstructure", *Angew. Chem.* 37, 1998, pp. 550-575.
66. Simpson, T. R. E., Parbhoo, B., Keddie, J.L., „The dependence of the rate of crosslinking in poly(dimethyl siloxane) on the thickness of coatings", *Polymer* 44, 2003, pp. 4829-4838.
67. Iji M., Kiuchi Y., „Flame resistant glass-epoxy printed wiring boards with no halogen or phosphorus compounds", *Journal of Materials Science: Materials in Electronics*, Volume 15, Number 3, 2004, pp. 175-182(8).
68. <http://www.isola.de/>
69. Japanese Patent Publication Nos. 13508/ 1978 and 5836/ 1982.
70. Stephen J., „Siloxane Polymers", Prentice Hall, 1993.
71. <http://www.wacker.com/>
72. Shigeyoshi S., Mizoe, N., Sugimoto, M., „Theoretical Study of Platinum(0)-Catalyzed Hydrosilylation of Ethylene. Chalk-Harrod Mechanism or Modified Chalk-Harrod Mechanism", *Organometallics*, 17 (12), 1998, pp. 2510 -2523.

73. Giorgi, G., et al., „A theoretical investigation of the Chalk-Harrod and modified Chalk-Harrod mechanisms involved in hybrid integrated circuit building”, *Computational chemistry and molecular dynamics*, Volume 20, Issue 5, 2004, pp. 781-791.
74. Sakaki, S., „Theoretical Study of Reaction Mechanism of Hydrosilylation Reactions”, *Keiso Kagaku Kyokaiishi*, VOL.1, NO.20, 2004, pp. 4-9.
75. Angioni, E., et al., „UV spectral properties of lipids as a tool for their identification”, *European Journal of Lipid Science and Technology*, Volume 104, Issue 1, 2002, pp. 59-64.
76. <http://ec.europa.eu/environment/>
77. Nissen, F., Griesse, H., Middendorf, A., Muller, J., Potter, H., Reichl, H., „Environmental screening of packaging and interconnection technologies, Environmentally Conscious Design and Inverse Manufacturing”, *Proceedings. First International Symposium On Eco Design*, Volume 1, Issue 2, 1999, pp. 754- 759.
78. Mauerer, O., „Polymer Degradation and Stability”, *New reactive, halogen-free flame retardant system for epoxy resins*, Volume 88, Issue 1, 2005, pp. 70-73.
79. <http://www.turi.org/>
80. <http://lhcb-tech-coor.web.cern.ch/lhcb-tech-coor/Safety/documents/FireTests-FR4.PDF>.
81. http://lhcb-elec.web.cern.ch/.../ElectronicsInstallation/PCB_FR4/documents/Halogen_free_PCBS_status_March-04.pdf.
82. Segerberg, T., Gumaelius, L., Hessel, H., Ostensson, E., „Toxicological aspects of halogen free flame retardants based on denitrification inhibition tests”, *Proceedings of the 2000 IEEE International Symposium on Electronics and the Environment*, 2000, pp. 69-74.
83. Park, S., Lee, H., „ Effect of atmospheric-pressure plasma on adhesion characteristics of polyimide film”, *J.colloid and interface science*, Vol. 285, 2005, pp. 267-272.
84. Luo, S.J, Vidal, M., and Wong, C.P., „Study on surface tension and adhesion in electronic packaging”, *Proc 50th Electronic Components and Technology Conf*, Las Vegas, 2000, pp. 586-591.
85. Vladimirov, L., Oleinik, E., „FT-IR studies of thermal history effects on

- molecular structure of epoxy resin systems”, *Microchimica Acta*, Volume 94, 1988, pp. 329-333.
86. Cherian, A., Varghese, L., Tachil, T., „Epoxy-modified, unsaturated polyester hybrid networks”, *European Polymer Journal*, Volume 43, Issue 4, 2007, pp. 1460-1469.
 87. Hong S.-G.1; Wu C.-S, „DSC and FTIR analysis of the curing behaviors of epoxy/ DICY/ solvent open systems”, *Thermochimica Acta*, Volume 316, Number 2, 2002, pp. 167-175(9).
 88. <http://www.dupont.com>
 89. Lee S., Tien Y., Hsu C.F., „FTIR Analysis of Plasma Damage of Kapton”, *Plasmas and Polymers*, Volume 4, Numbers 2-3, 1999, pp. 229-239(11).
 90. www.lle.rochester.edu/pub/review/v88/88_05_Optimizing.pdf
 91. Lee, S., Tien, Y., „Spectroscopic investigations of plasma damage of kapton”, *Journal of Vacuum Science & Technology B: Microelectronics and Nanometer Structures*, Volume 18, Issue 2, 2000, pp. 805-810.
 92. Siau, S., Vervaet, A., Calster, A., „Influence of wet chemical treatments on the evolution of epoxy polymer layer surface roughness for use as a build-up layer”, *Applied Surface Science*, Volume 237, Issues 1-4, 2004, pp. 457-462.
 93. Owens, D. and Wendt, R., „Estimation of the surface free energy of polymers,” *J.Appl.Polym.Sci.*, Vol. 13, 1963, pp. 1741-1747.
 94. Guimond, S., Wertheimer, M.R., „Surface degradation and hydrophobic recovery of polyolefins treated by air corona and nitrogen atmospheric pressure glow discharge”, *J. Appl.Polym.Sci.*, Vol. 94, 2004, pp. 1291-1303.
 95. Oosterom, R., Ahmed, T.J. *et al*, „Adhesion performance of UHMWPE after different surface modification techniques”, *Med Eng Phy.*, Vol. 28, 2005, pp. 323-330.
 96. Song, R., Chiang M, *et al*, „Combinatorial peel tests for the characterization of adhesion behavior of polymeric films”, *Polymer*, Vol. 46, 2005, pp. 1643-1652.
 97. <http://www.ob-ultrasound.net/history-realtime.html>
 98. Crowe, D., *Design for Reliability*, CRC, 2001.

6.2 Own publications

A. Journals

1. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical absorption in transparent PDMS materials applied for multimode waveguides fabrication,” Optical materials, in press.
2. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „ Raman, infrared and visible spectroscopy of PDMS for characterization of polymer optical waveguide material”, in preparation
3. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical properties of polydimethylsiloxane (PDMS) used for optical waveguides”, in preparation.
4. Zhu, D., Cai, D. et al., „Environmental stability of PDMS-waveguides for electrical-optical circuit boards”, Electron. Lett., vol. 5, 2007, pp. 627-628.
5. Kopetz, S., Cai, D. et al, „PDMS-based optical waveguide layer for integration in electrical-optical circuit boards”, ÄEU-International Journal of Electronics and Communications, vol. 61, 2007, pp. 163-167.

B. Conference papers and posters

1. Cai, D., Neyer, A., „Realization of Electrical-Optical-Circuit-Board self-packaging,” Proceedings on 57th Electronic Components and Technology Conference, ECTC 2007, Reno, Nevada, USA, 2007, pp. 1368-1374.
2. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Estimation of absorption loss in siloxane-based materials implemented as passive optical interconnects,” Proceedings on Optical Fiber Communication, OFC 2007, Anaheim, California, USA, 2007, Techn. Digest, paper JWA 27.
3. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Near-infrared and visible spectroscopy of PDMS for characterisation of polymer optical waveguide materials,” Proceedings on the XXVIIIth European Congress on Molecular Spectroscopy, Aug. 2006, Istanbul, Turkey.
4. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical absorption due to high overtone of molecular fundamental vibrations in PDMS materials applied for data communication,” Proceedings on the 1st International Conference on Physics of Optical Materials and Devices, Sep. 2006, Montenegro.
5. Cai, D., Neyer, A., Kuckuk, R., Heise, H.M., „Optical spectroscopy applied on

characterization of PDMS for optical interconnects," Proceedings on the 4th International Conference on Advanced Vibrational Spectroscopy. Jun. 2007. Corfu Island, Greece.

6. Neyer, A., Rabe, E., kopetz, S., Zhu, D., and Cai, D., „Large-area replication technology for the production of electrical-optical circuit board," Proceedings on LEOS Summer Topical Meetings, Oregon, USA, 2007, pp.127-128.
7. Neyer, A., Rabe, E., kopetz, S., Zhu, D., and Cai, D., „Polymer multimode waveguides for integrated optics," Proceedings on European Conference of Integrated Optics, ECIO 2007, Copenhagen, Denmark, 2007, pp. 25-27.