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LECTURE COURSES

1. Heat Transfer (Undergraduate Course), Mechanical, Material and Aerospace Engineering (MMAE) Department
2. Laser Materials Processing (Graduate Course), MMAE Dept.
3. Materials Processing Techniques (Graduate Course), MMAE Dept.
4. Interference, Diffraction and Coherence (Graduate Course), College of Optics and Photonics

AWARDS AND HONORS

Teaching Award and Award-Winning Research Involving Students and Industry Collaborators:

1. TIP (UCF's Teaching Incentive Program) Award, received this award in the academic year 2002-2003.
2. Fellow of the Laser Institute of America
3. Metal Tech Industries, Inc., A. Kar's collaborator on a STTR Phase II project entitled *Innovative Applications of Advanced Photonics - Precision Laser Welding of Thin-Sheet Metals for Gasket Fabrication*, was awarded the Fifth Annual **Tibbetts Award** in October 2000 by the U.S. Small Business Administration, Washington, D.C., in recognition of its unique contribution as a **Model of Excellence** for the Small Business Innovation Research Program.
4. Jihua Du won first prize for his paper entitled *Effect of Finite Thickness on Laser Welding of Thin Sheet Metals*, in the Student Paper Award Competition at the International Congress on Applications of Lasers and Electro-Optics, 1999 (ICALEO'99), San Diego, California, November 15-18.
5. Franz-Josef Kahlen won third prize for his paper entitled *Chemical and Microstructural Studies for Laser-Fabricated Metal Parts of Graded Materials*, in the Student Paper Award Competition at the ICALEO'99.
6. Jian Xie submitted a paper based on his dissertation, and received an AWS (American Welding Society) award and won 2000 Henry Grajon Prize from IIW (International Institute of Welding).
7. Jihua Du won second prize for his paper entitled *Laser Marginal Lap Micro-Welding for Ultra Thin Sheet Metal*, in the Student Paper Award Competition at the International Congress on Applications of Lasers and Electro-Optics, 2000 (ICALEO'00), Detroit, Michigan, October 2-5.

8. Yonggang Li won first prize for his paper entitled Thermo-Mechanical Effects in Laser Microprocessing for Dieless Metal Wire Drawing, in the Student Paper Award Competition at the International Congress on Applications of Lasers and Electro-Optics, 2001 (ICALEO'01), Jacksonville, Florida, October 15-18.

BOOK, HAND BOOK SECTIONS, BOOK SECTIONS AND CONFERENCE PROCEEDINGS PUBLISHED

1. J. Mazumder and A. Kar, Theory and Application of Laser Chemical Vapor Deposition, Plenum Press, New York, 1995 - Book.
2. Latham, W. P. and Kar, A., LIA (Laser Institute of America) Laser Materials Processing Handbook, Chapter 3: Sections 3.1 (Properties of Laser Beams), 3.3 (Focusing and Depth of Focus) and 3.4 (Mode Quality), edited by J. F. Ready, D.F. Farson and T. Feeley, (Magnolia Publishing, Inc, Orlando, 2001) – Handbook.
3. Latham, W. P. and Kar, A., LIA (Laser Institute of America) Laser Materials Processing Handbook, Chapter 12: Section 12.1.3 (Cutting with a Chemical Oxygen-Iodine Laser (COIL)), edited by J. F. Ready, D.F. Farson and T. Feeley, (Magnolia Publishing, Inc, Orlando, 2001) - Handbook.
4. Bass, M. and Kar, A., “Laser-Materials Interactions,” Book Chapter in Encyclopedia of Physical Science and technology, Third Edition, Volume 8, Managing Editor: Robert K. Matsumura, (Academic Press, San Diego, California, 2002).
5. Guo, W. and Kar, A., “Thermal Effects and Plasma Absorption in Laser Materials Processing,” Chapter in a Book: Nonlinear Instability, Chaos and Turbulence, Series: Advances in Fluid Mechanics, Volume 2, edited by L. Debnath and D.N. Riahi, (Computational Fluid Mechanics Publications, Southhampton, U. K., 1999) – Book section.
6. Proc. 16th International Congress on Applications of Lasers and Electro-Optics, 1997 (ICALEO'97), Laser materials Processing, eds. Fabbro, R., KAR, A. and Matsunawa, A., (Published by Laser Institute of America, Orlando, 1998).

PATENTS

1. A. Kar, S. Sankaranarayanan and F.-J. Kahlen, *One-Step Rapid Manufacturing of Metal and Composite Parts*, U. S. Patent 6,203,861 B1, March 20, 2001.
2. B.L. Hoekstra, J. A. Pierola and A. Kar, *Method and Apparatus for Separating Non-Metallic Substrates Utilizing a Supplemental Mechanical Force Applicator*, U. S. Patent 6,252,197 B1, June 26, 2001.
3. A. Kar, S. Sankaranarayanan and F.-J. Kahlen, *One-Step Rapid Manufacturing of Metal and Composite Parts (same title as in 1)*, U. S. Patent 6,526,327 B2, February 25, 2003.
4. N.R. Quick, A. Kar, Y. Li and R.R. McNeice, *Apparatus and Method for Drawing Continuous Fiber*, 2004 (US Patent No. 6,732,562).
5. A. Jocelyn, T. Flower, A. Keevil, M. Ackerman, J. Way, D. Nash and A. Kar, *Laser Dieless Forming*, 2003, (U.K. Patent No. WO03013757).
6. N.R. Quick, A. Kar and I.A. Salama, *Process for Fabricating Semiconductor Component*, US Patent (submitted, 2004).
7. N.R. Quick and A. Kar, *Laser-Assisted Nano-Deposition*, U.S. Patent (submitted, 2004).

8. N.R. Quick and A. Kar, Optical Device and Method of Making, U.S. Patent (submitted, 2005).

JOURNAL PAPERS

1. A. Kar and R.A. Axford, "Analytic Study of Conduction and Convective Heat Transfer in Finite Tube Bundles," *Nucl. Engrg. Des.*, Vol. 107, pp. 253-269, 1988.
2. A. Kar and J. Mazumder, "One-dimensional Diffusion Model for Extended Solid Solution in Laser Cladding," *J. Appl. Phys.*, Vol. 61, pp. 2645-2655, 1987.
3. J. Mazumder and A. Kar, "Solid Solubility in Laser Cladding," *J. Metals*, Vol. 9, pp. 18-23, 1987.
4. A. Kar and J. Mazumder, "One-dimensional Finite-medium Diffusion Model for Extended Solid Solution in Laser Cladding of Hf on Nickel," *Acta Metall.*, Vol. 36, pp. 701-712, 1988.
5. A. Kar and J. Mazumder, "Extended Solid Solution and Nonequilibrium Phase Diagram for Ni-Al Alloy Formed during Laser Cladding," *Metall. Trans. A*, Vol. 20A, pp. 363-371, 1989.
6. A. Kar and J. Mazumder, Three-dimensional Transient Thermal Analysis for Laser Chemical Vapor Deposition on Uniformly Moving Finite Slabs, *J. Appl. Phys.*, Vol. 65, pp. 2923-2934, 1989.
7. J. Mazumder, S. Sircar, C. Ribaud, and A. Kar, "New Materials: Nonequilibrium Synthesis by Laser," *J. of Laser Application*, Vol. 1, pp. 27-42, 1989.
8. A. Kar and J. Mazumder, "Two-dimensional Model for Material Damage due to Melting and Vaporization During Laser Irradiation," *J. Appl. Phys.*, Vol. 68, pp. 3884-3891, 1990.
9. A. Kar, M.N. Azer and J. Mazumder, Three-Dimensional Transient Mass Transfer Model for Laser Chemical Vapor Deposition of Titanium on Stationary Finite Slabs, *J. Appl. Phys.*, Vol. 69, pp. 757-766, 1991.
10. A. Kar, C.L. Chan, and J. Mazumder, "Comparative Studies on Nonlinear Hyperbolic and Parabolic Heat Conduction for Various Boundary Conditions: Analytic and Numerical Solutions," *ASME J. Heat Transfer*, Vol. 114, pp. 14-20, February 1992.
11. A. Kar, T. Rockstroh, and J. Mazumder, "Two-dimensional Model for Laser-induced Materials Damage: Effects of Assist Gas and Multiple Reflections inside the Cavity," *J. Appl. Phys.*, Vol. 71, pp. 2560-2569, 1992.
12. A. Kar and J. Mazumder, "Model for Nonequilibrium Partitioning during Rapid Solidification of Binary Concentrated Solutions," *Acta Metall. Mater.*, Vol. 40, pp. 1873-1881, 1992.
13. O. Conde, A. Kar and J. Mazumder, Laser Chemical Vapor Deposition of TiN Dots: A Comparison of Theoretical and Experimental Results, *J. Appl. Phys.*, Vol. 72, pp. 754-761, 1992.
14. G. Agrawal, A. Kar, and J. Mazumder, "Theoretical Studies on Extended Solid Solubility and Nonequilibrium Phase Diagram for Nb-Al Alloy Formed during Laser Cladding," *Scripta Metallurgica et Materialia*, Vol. 28, pp. 1453-1458, 1993.
15. A. Kar and J. Mazumder, "Analytic Solution of the Stefan Problem in Finite Mediums," *Quart. Appl. Math.*, Vol. 52, pp. 49-58, 1994.

16. A. Kar and J. Mazumder, Mathematical Model for Laser Ablation to Generate Nanoscale and Submicrometer-Size Particles, *Phys. Rev. E* , Vol. 49, pp. 410-419, 1994.
17. J. Singh, B. N. Bhat, R. Poorman, A. Kar and J. Mazumder, "Laser Glazing of Vacuum Plasma-Sprayed Narloy-Z," *Surf. Coat. Tech.* , Vol. 79, pp. 35-49, 1996.
18. A. Kar and J. Mazumder, "Mathematical Modeling of Key-Hole Laser Welding," *J. Appl. Phys.*, Vol. 78, pp. 6353-6360, 1995.
19. M. Li, A. Kar, V. Desai and A. Khanna, "High Temperature Oxidation Resistance Improvement of Titanium using Laser Surface Alloying," *J. Mater. Sci.*, Vol. 30, pp. 5093-5098, 1995.
20. A. Kar, and M.D. Langlais, "Opto-Thermal Effects of Laser Modes in Laser Materials Processing," *Opt. Quant. Elec.*, Vol. 27, pp. 1165-1180, 1995.
21. A. Kar, J. E. Scott and W. P. Latham, "Theoretical and Experimental Studies of Thick-Section Cutting with a Chemical Oxygen-Iodine Laser (COIL)," *J. Laser Applications* , Vol. 8, pp. 125-133, 1996.
22. A. Kar, J. E. Scott and W. P. Latham, "Effects of Mode Structure on Three-Dimensional Laser Heating due to Single or Multiple Rectangular Laser Beams," *J. Appl. Phys.*, Vol. 80, pp. 667-674, 1996.
23. A. Kar and J. Mazumder, Laser Chemical Vapor Deposition of Thin Films, *Mar. Sci. Eng. B*, Vol. B41, pp. 368-373, 1996.
24. J. Mazumder, P. S. Mohanty and A. Kar, "Mathematical Modeling of Laser Materials Processing," *Int. J. of Materials and Product Technology*, Vol. 11, pp. 193-252, 1996.
25. J. Cheng and A. Kar, "Mathematical Model for Laser Densification of Ceramic Coating," *J. Mat. Sci.*, Vol. 32, 1997, pp. 6269-6278.
26. J. Cheng and A. Kar, Studies on Laser Densification of Ceramic Coatings, *Materials and Manufacturing Processes*, Vol. 12, 1997, pp. 487-503.
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28. J. Xie and A. Kar, "Melting and Vaporization for Large-Area Film Removal with a Chemical Oxygen-Iodine Laser," *J. Appl. Phys.*, Vol. 82, 1997, pp. 4744-4751.
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30. A. Kar, J. A. Rothenflue and W. P. Latham, "Scaling Laws for Thick-Section Cutting with a Chemical Oxygen-Iodine Laser," *J. Laser Applications* , Vol. 9, 1997, pp. 279-286.
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32. D.K. Sengupta, T. Horton, W. Fang, A. Curtis, J. Li, S.L. Chuang,, H. Chen, M. Feng, G.E. Stillman, A. Kar, J. Mazumder, L. Li and H.C. Liu, Red-Shifting of a Bound-to-Continium GaAs/AlGaAs quantum-Well Infrared Photodetector Response via Laser Annealing, *Appl. Phys. Lett.*, Vol. 70, 1997, pp. 3573-3575.
33. W. Pecharapa and A. Kar, "Effects of Phase Changes on Weld Pool Shape in Laser Welding," *J. Phys. D: Appl. Phys.*, Vol. 30, 1997, pp. 3322-3329.

34. K. Farooq and A. Kar, "Removal of Laser-Melted Material with an Assist Gas," *J. Appl. Phys.*, Vol. 83, 1998, pp. 7467-7473.
35. P. Strombeck and A. Kar, "Self-Focusing and Beam Attenuation in Laser Materials Processing," *J. Phys. D: Appl. Phys.*, Vol. 31, 1998, pp. 1438-1448.
36. S. Sankaranarayanan, W. Guo and A. Kar, "Characteristics of Laser-Fabricated Metal Structures," *Materials and Manufacturing Processes*, Vol. 13, 1998, pp. 537-554.
37. W. Guo and A. Kar, "Interfacial Instability and Microstructural Growth due to Rapid Solidification in Laser Processing," *Acta Materialia*, Vol. 46, No. 10, 1998, pp. 3485-3490.
38. A. Kar, D. L. Carroll, W. P. Latham, and J. A. Rothenflue, "Cutting Performance of a Chemical Oxygen-Iodine Laser on Aerospace and Industrial Materials," *J. Laser Applications*, Vol. 11, 1999, pp. 119-127.
39. W. Guo and A. Kar, "Prediction of Microstructures in Laser Welding of Stainless Steel AISI 304," *J. Laser Applications*, Vol. 11, 1999, pp. 185-189.
40. S. Sankaranarayanan and A. Kar, "Nonlinear Effects of Laser-Plasma Interaction on Melt Surface Temperature," *Journal of Physics D: Applied Physics*, Vol. 32, 1999, pp. 777-784.
41. K. Farooq and A. Kar, "Effects of Laser Mode and Scanning Direction on Melt Pool Shape," *Journal of Applied Physics*, Vol. 85, 1999, pp. 6415-6420.
42. J. Xie and A. Kar, "Laser Welding of Thin Sheet Steel with Surface Oxidation," *Welding J.*, Vol. 78, No. 10, 1999, pp. 343s-348s.
43. S. Sankaranarayanan, H. Emminger and A. Kar, Energy Loss in the Plasma during Laser Drilling, *Journal of Physics D: Applied Physics*, Vol. 32, 1999, pp. 1605-1611.
44. D. Espinal and A. Kar, Thermochemical Modeling of Oxygen-Assisted Laser Cutting, *J. Laser Applications*, Vol. 12, 2000, pp. 16-22.
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46. U. Tanriver, J. Longobardi, W.P. Latham and A. Kar, Effects of Absorptivity, Shielding Gas Speed and Contact Media for Sheet Metal Laser Welding, *Science and Technology of Welding and Joining*, 2000, Vol. 5, pp. 310-316.
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48. F.-J. Kahlen and A. Kar, Thermal and Dimensional Characteristics of Vapor-Plasma Plume and layer Deposition in Laser-Aided Rapid Manufacturing, Special issue on Laser Materials Processing in *Int. J. High Temp. Material Processes*, Vol. 4, 2000, pp. 161-199.
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51. J. Cheng, F.-J. Kahlen and A. Kar, Effects of Intrapulse Structure on Hole Geometry in Laser Drilling, *J. Laser Applications*, Vol. 12, 2000, pp. 232-238.

52. F.-J. Kahlen and A. Kar, "Tensile Strengths for Laser-Fabricated Parts and Similarity Parameters for Rapid Manufacturing," *ASME J. Manufacturing Science and Engineering*, 2001, Vol. 123, pp. 38-44.
53. F.-J. Kahlen and A. Kar, Residual Stresses in Laser-Deposited Metal Parts, *J. Laser Applications*, Vol. 13, 2001, pp. 60-69.
54. D. K. Sengupta, N. R. Quick and A. Kar, Laser Conversion of Electrical Properties for Silicon Carbide Device Applications, *Journal of Laser Applications.*, 2001, Vol. 13, pp. 26-31.
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57. U. Tanriver and A. Kar, An Approximate Analytic Solution of a Particular Boundary Value Problem (Research Notes), *International Journal of Mathematics and Mathematical Sciences*, Letter, Vol. 27, 2002, pp. 513-520..
58. Y. Li, N.R. Quick and A. Kar, Dieless Laser Drawing of Fine Metal Wires, *Journal of Materials Processing Technology*, Vol. 123, 2002, pp. 451-458.
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60. J. Du, J. Longobardi, W.P. Latham and A. Kar, Laser Marginal Lap MicroWelding for Ultrathin Sheet Metal, *Journal of Laser Applications*, Vol. 14, 2002, pp. 4-8.
61. I.A. Salama, N.R. Quick and A. Kar, Laser Doping of Silicon Carbide Substrates, *Journal of Electronic Materials*, Vol. 31, 2002, pp. 200-208.
62. T. Thorslund, F.-J. Kahlen, and A. Kar, Temperatures, Pressures and Stresses during Laser Shock Processing, *Optics and Lasers in Engineering*, Vol. 39, 2003, pp. 51-71.
63. Y. Li, N.R. Quick and A. Kar, Structural evolution and drawability in laser dieless drawing of fine nickel wires, *Materials Science and Engineering A*, Vol. A358, 2003, pp. 59-70.
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66. I.A. Salama, N.R. Quick, and A. Kar, Laser Direct Writing and Doping of Diamond-like Carbon, Polycrystalline Diamond and Single Crystal Silicon Carbide, *Journal of Laser Applications*, Vol. 16, 2004, pp. 92-99.
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4. Chan, C. L., Kar, A., and Mazumder, J., "On Stefan Problems with Hyperbolic Heat Conduction," *Symp. Heat and Mass Transfer*, University of Illinois at Urbana-Champaign, Illinois, October 1-2, 1987.
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18. Mazumder, J. and Kar, A., "Transport Phenomena in Laser Materials Processing," Invited Paper, OJI International Conference on Advance Heat Transfer for Manufacturing and Materials Processing, Tomakomai, Japan, October 28 - November 1, 1990.
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20. Kar, A., Mazumder, J., and Rockstroh, T., "Two-Dimensional Model for Materials Removal for Laser Drilling," 4th European Conference on Laser Treatment of Materials (ECLAT '92), Gottingen, Germany, October 12-15, 1992.
21. Kar, A., Azer, M. N., Chen, X., and Mazumder, J., "Theoretical and Experimental Studies of Mass Transfer in Laser Chemical Vapor Deposition of Titanium," Second International Conference on Laser Advanced Materials Processing (LAMP'92), Nagaoka City, Japan, June 7-12, 1992.
22. Mazumder, J. and Kar, A., "Modeling of Laser Materials Processing," NATO Advanced Study Institute on Laser Applications to Mechanical Industry, Erice, Italy, April 4-16, 1992.
23. Kar, A., and Mazumder, J., "A Laser Ablation Model to Produce Nanoscale Particles," ICALEO '93, Orlando, Florida, October 25-29, 1993.
24. Kar, A., and Mazumder, J., "Laser Chemical Vapor Deposition of Thin Films," International Conference on Processing and Advanced Application of Lasers (ICPAAL) - Engineering Foundation Conference, Palm Coast, Florida, May 1 - 6, 1994.

25. Kar, A. and Mazumder, J., "Modeling in Laser Materials Processing: Melting, Alloying, Cladding," NATO Advanced Study Institute on Laser Processing: Surface Treatment and Film Deposition, Sesimbra, Portugal, July 3 -16, 1994, **Invited Speaker**.
26. Kar, A. and Mazumder, J., "Modeling of Laser Chemical Vapor Deposition of Thin Films," NATO Advanced Study Institute on Laser Processing: Surface Treatment and Film Deposition, Sesimbra, Portugal, July 3 -16, 1994, **Invited Speaker**.
27. Kar, A. and Mazumder, J., "Size Prediction for Nanoscale Particles formed during Laser Ablation," TMS Meeting, International Symposium on Novel Techniques in Synthesis and Processing of Advanced Materials, Chicago, Illinois, October 2 - 6, 1994.
28. Kar, A. and Mazumder, J., "Mathematical Modeling for Multiple Reflections during Laser Drilling," 13th International Congress on Applications of Lasers and Electro-Optics (ICALEO '94), Organized by Laser Institute of America, Orlando, Florida, October 17 - 20, 1994.
29. Kar, A. and Mukherjee, A., "Design Rules and Digital Interface for Laser-Aided Direct Rapid Prototyping (LADRP)," NSF Workshop on "Design Methodologies for Solid Freeform Fabrication," Carnegie Mellon University, June 3-5, 1995. **Workshop**
30. Kar, A., "Oscillation in Solute Distribution during Laser Surface Alloying," TMS Meeting, International Conference on Beam Processing of Advanced Materials, Cleveland, Ohio, October 30 - November 2, 1995.
31. Scott, J. E., Latham, W. P. and Kar, A., High Speed Material Processing of Thick Stainless Steel with a Chemical Oxygen-Iodine Laser, in Proceedings of the International Congress on the Applications of Lasers and Electro-Optics, 1995 (ICALEO '95): Laser Materials Processing, editors: J. Mazumder, A. Matsunawa and C. Magnusson (Laser Institute of America, Florida, 1995).
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