Construction Materials Consultants, Inc.

222 Harvey Avenue
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www.cmc-concrete.com

DIPAYAN JANA

President, Petrographer,
Materials Scientist, Professional
Geologist



EDUCATION

- Univ. of Calcutta, India; Bachelor of Science (B.Sc.) - Geological Sciences (Major in Petrology/Petrography), 1987
- Univ. of Calcutta, India; Master of Science (M. Sc.) - Geological Science (Major in Petrology, Mineralogy, Geochemistry), 1990
- Univ. of Illinois, Chicago, USA; Master of Science (M.S.) Geological Sciences (Major in Petrology/Geochemistry), 1993
- Columbia University, USA; Ph.D. Program - Geological Sciences (Major in Experimental Petrology/Mineralogy), 1993-1996

REGISTRATION

- Professional Geologist, Washington & Texas.

SPECIALTY

- Characterization, quality evaluation, failure investigation, testing, and research of construction materials including:
- Clinker, cement, aggregate, concrete, masonry, mortar, stone, plaster, stucco, and tile products
- Consulting, Expert Testimony, Litigation support
- Performance, durability, historic preservation, and repair
- Innovative research on new materials and methods

METHODOLOGY

- Petrographic Examinations (Optical Microscopy)
- Scanning Electron Microscopy X-ray Microanalysis
- X-ray Diffraction
- X-ray Fluorescence
- Chemical Analysis
- Thermal Analysis
- Ion Chromatography
- Fourier Transform Infrared Spectroscopy
- Physical Testing

EXPERIENCE

- Senior Petrographer, The Erlin Company, 1999-2003
- Petrographer/Materials Scientist/Assistant Laboratory Manager, Testwell Laboratories, Inc., 1999
- Petrographer / Materials Scientist/ Laboratory Manager, Cole Consulting Corporation, 1996-1999
- Teaching Assistant - Petrography, Petrology, Mineralogy, Columbia University, 1993-1996
- Teaching Assistant - Petrography, Petrology, Mineralogy; University of Illinois at Chicago, 1990-1993

PROFESSIONAL AFFILIATIONS

- American Society for Testing and Materials (ASTM)
- American Concrete Institute (ACI)
- American Society of Civil Engineers (ASCE)
- International Concrete Repair Institute (ICRI)
- American Ceramic Society (ACE)
- Society of Concrete Petrographers (SCP)
- Geological Society of America (GSA)
- Geochemical Society of America
- Mineralogical Society of America (MSA)
- American Geophysical Union (AGU)

TECHNICAL COMMITTEES

- ACI Committee 116 – Cement & Concrete Terminology
- ACI Committee 201 – Durability of Concrete
- ACI Committee 221 – Aggregates
- ACI Committee 302 – Construction of Concrete Floors
- ASTM Com. C09 – Concrete and Concrete Aggregates
- ASTM Committee C09.65 – Petrography

REPRESENTATIVE PROJECTS

- Concrete projects involving airports, residential & commercial buildings, parking garages, sidewalks, driveways, warehouse slabs, historic structures, pipelines, etc.
- Concrete Surface Deterioration (Scaling, Spalling, Cracking, Crazing, Popout, Mortar liftoff, Discoloration, Delamination, Blistering, Dusting, Efflorescence, Abrasion, Impact)
- Concrete Quality Evaluation (Mix design conformance, cement type, fly ash, slag, low strength, air content)
- Chemical attacks on concrete (Acid, alkali, sulfate, chloride, seawater attacks in concrete; corrosion of steel in concrete)
- Physical attacks on concrete (deterioration due to exposure to cyclic freezing and thawing and high temperatures); early freezing of concrete or mortar
- Clinker and cement quality evaluation, composition, and classification; cement conformance to ASTM C 150
- Aggregate evaluation, petrography, reactivity, & soundness
- Masonry evaluation and failure investigation
- Evaluation of mortar in historic restoration
- Stone evaluation and failure investigation
- Investigation of tile distress & floor covering failures

PUBLICATIONS

More than fifty (50) publications in peer-reviewed books, proceedings, and journals on application of petrography in concrete, masonry, stone, and natural rocks.

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PROFESSIONAL REGISTRATION



STATE OF TEXAS
BOARD OF
PROFESSIONAL GEOSCIENTISTS

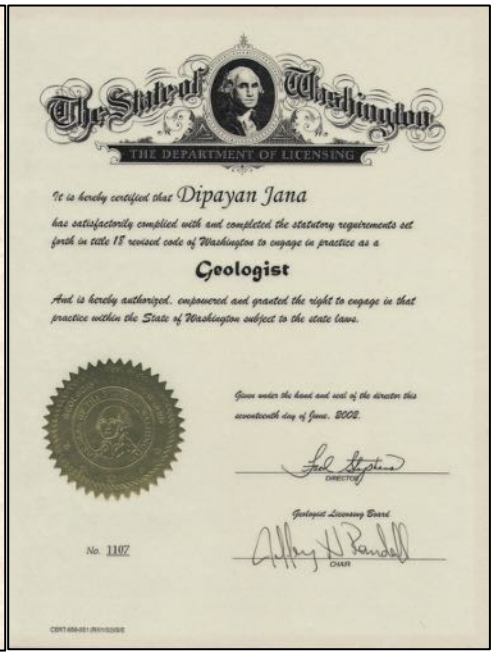
Dipayan Jana, P.G.

Geology
License Number 2712

In accordance with the provisions of the Texas Geoscience Practice Act, the Texas Board of Professional Geoscientists hereby certifies that the above named individual was licensed as a Professional Geoscientist on August 31, 2003.

Certificate is INVALID without current renewal card.

Ron Kitchens, TBPG Chairman



The State of Washington
THE DEPARTMENT OF LICENSING

It is hereby certified that *Dipayan Jana*
has satisfactorily complied with and completed the statutory requirements set forth in title 18 revised code of Washington to engage in practice as a

Geologist

And is hereby authorized, empowered and granted the right to engage in that practice within the State of Washington subject to the state laws.

Given under the hand and seal of the director this seventeenth day of June, 2002.

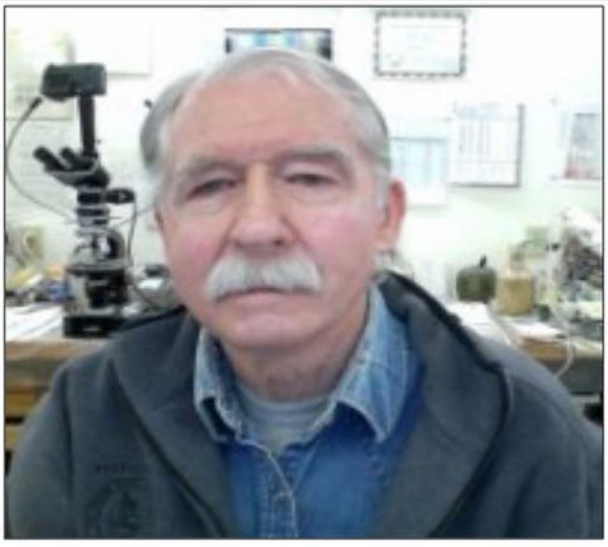
DIRECTOR

Geologist Licensing Board

No. 1107

CHAIR

TESTIMONIAL



DONALD H. CAMPBELL

Principal Petrographer at Campbell Petrographics, one of the world's leading authorities on cement and concrete microscopy, and author of the well-known book "Microscopical Examinations and Interpretation of Portland Cement and Clinker."

"Dipayan Jana is undoubtedly one of the best petrographers around. One of his strongest talents is utilizing the blend of light- and electron-microscopy in diagnosing concrete and mortar failures. Furthermore, he can write quite well, having made many excellent contributions to our professional journals. I highly recommend Dipayan."

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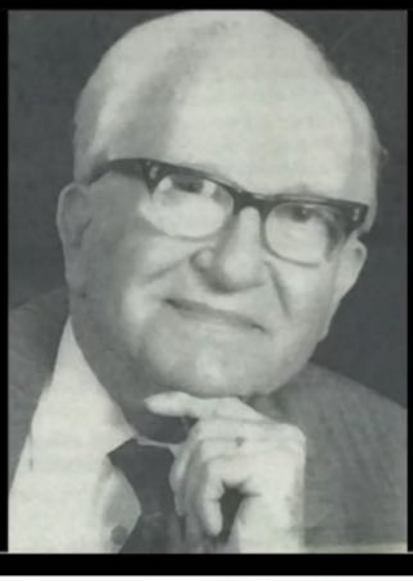


LATE DR. BRYANT MATHER

U.S. Army Corps. Of Engineers

Comment on Dipayan's article "Delamination – A state-of-the-art review." Click on the following comment to read handwritten 4-page comments of this 'concrete giant' in 2002, at the age of 92, the same year that Bryant passed away.

"This is an exhaustive study. I was glad to get to read this. I learned a lot."



LATE DR. RICHARD C. MIENELZ

Materials and Petrography

Comment on Dipayan's article "Troubleshooting Concrete Problems Through Microscopy" 1997

"It is very well written, yet succinct, and provides a good perspective of the application of microscopy in the concrete industry. I am left with little upon which to comment as a basis for improvement."



DONALD H. CAMPBELL

Principal Petrographer at Campbell Petrographics, one of the world's leading authorities on cement and concrete microscopy, and author of the well-known book "Microscopical Examinations and Interpretation of Portland Cement and Clinker."

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MICHAEL P. EDISON

President, Edison Coatings, Inc. Plainville, Connecticut

"CMC employs an impressive array of technological tools to provide comprehensive analyses for historic masonry mortars. They also deliver results on a reliable schedule to meet the time pressure of our clients' projects."



JAMES W. ANDERSON, PE

Principal/Structural Division Manager, Woodstock, Maryland

"I have utilized Dr. Jana's and CMC's services exclusively for over seventeen years. I find their reports to be thorough, conclusive and always delivered in a timely fashion (usually sooner than promised)."



AMANDA EDWARDS

Sr. Architectural Conservator, Arlington, Virginia

"CMC, Inc. is an excellent resource for petrographic analysis of historic mortars. Mortar analysis for historic buildings must go beyond just understanding the components of the mortar to understanding how those components are contributing to the success or failure of that mortar over time. This is where CMC, Inc. succeeds in guiding architects towards the right restoration mortar mix. The reports are thorough yet concise with reliable turn-around times. Dr. Jana is always willing to discuss the findings and his clients can count on his expertise."

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DENNIS WIPF P.E.

Structural Engineer, Phoenix, Arizona

"I have worked with CMC for well over 10 years with petrographic analysis. They have consistently dug deeper, using SEM or other methodology to better understand the real cause of the problem. Their reports and photographs are excellent, and they explain what their findings mean, not just what they saw."

BRANDON PRICE

Delta Testing Labs, New York

"I highly recommend working with CMC for their exceptional professionalism, attention to detail, and timely reports. From the moment we began working with them over 15 years ago they demonstrated a deep understanding of our needs and provided a work that exceeded our expectations.

Throughout our working partnership, they have consistently delivered high-quality work and demonstrated a strong commitment to meeting our project timelines. Their communication skills are second to none, and they always keep us informed with detailed reports.

Furthermore, CMC is a pleasure to work with, always taking the time to listen to our concerns and offering proactive solutions to help us achieve our goals. We appreciate their willingness to go above and beyond to ensure our success, and we look forward to continuing our partnership with them for years to come.

Overall, I highly recommend CMC to anyone looking for a reliable, professional, and results-driven partner to help them achieve their project goals."

SPEC GROUP LLC

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FORENSIC & STRUCTURAL INVESTIGATIONS
CONSTRUCTION PROJECTS INSPECTIONS
VIBRATION MONITORING

PEDRO FEBO BORIA, Vice President

SPEC Group, San Juan, Puerto Rico

"CMC is an excellent resource for petrographic analysis. I have worked with CMC for the last 8 to 10 years with petrographic analysis. The services provided are returned in an on time manner. Their reports are excellent, easy to understand and very complete. I highly recommend CMC to anyone looking for a professional and complete petrographic analysis."

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CRAIG TESTING LABORATORIES OF MARYLAND, INC.

"Craig Testing Laboratories of Maryland, Inc. has had a professional relationship with CMC and Dipayan for over 20+ years. From our initial project, Dipayan and his staff have handled numerous projects involving various types of analysis and investigation.

The reports are completed quickly and thoroughly. The reports supply our client's with the requested information. Additionally, Dipayan is always available for consultation to walk the client through his findings.

CMC is an excellent resource to have on your team and we are thankful he is part of ours. Their knowledge, turnaround time, cost, and reporting would be an asset to any project."



ANTHONY H

Architectural Conservator, Limeworks.us

"We discovered CMC during our search for partner laboratories who could help us with client requests for instrumental mortar analyses. CMC was one of the few firms willing to take on smaller, less prestigious projects, while still providing timely and thorough results. I have found the firm to be knowledgeable, prompt, and responsive to all project inquiries and questions. CMC's fees are also very reasonable. It has been a pleasure to work with CMC, and I would certainly recommend someone looking for similar services reach out to them."



LATE MICHAEL L.J. MAHER

Editor, *Pyrite and Pyrrhotite*

"For those interested in learning the current state of knowledge of pyrrhotite-induced damage in concrete, Dipayan Jana's comprehensive review of '*Concrete Deterioration from the Oxidation of Pyrrhotite – A State-of-the-art Review*' is a masterful treatise on the topic. As a specialist consultant in construction and geological materials, with a focus on concrete petrography and advanced laboratory investigation techniques, Mr. Jana is well qualified to provide this overview. To set the context, the chapter provides a detailed review of pyrrhotite and pyrite problems in aggregates around the world. He goes on to describe his recommended investigation techniques and the broad range of laboratory analytical techniques available for detailed examination of recovered samples. The author uses illustrated examples of how the findings of these detailed forensic examinations were used in the case of the northeastern United States pyrrhotite problems, to understand the causes and progression of the resulting concrete damage. The detailed annotated microscopic images provide excellent insights into the interpretation of the various techniques described. Based on his extensive experience, Mr. Jana provides a five-step laboratory testing protocol for assessment of pyrrhotite reactivity risk in concrete aggregates."

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PUBLICATIONS OF DIPAYAN JANA

1. Jana, D., Type IL Cement and Concrete Scaling, Concrete International, American Concrete Institute, April 2026, pp. 66-76.

2. Jana, D., Influences of Aggregate, Concrete Quality and Exposure Condition on Pyrrhotite Oxidation and ISA-Related Damage in the County Donegal, Ireland – Case Studies from Damaged to Undamaged Homes and Crumbled Blocks to Strip Concrete Foundations, Proceedings on 2nd International Conference on Iron-Sulfide Reactions in Concrete Connecticut, USA, May 13th and 14th, May 2026.

3. Jana, D., From CT to MA: Case Studies of Crumbled Foundations from Pyrrhotite Oxidation and Internal Sulfate Attack in the Eastern US, Proceedings on 2nd International Conference on Iron-Sulfide Reactions in Concrete Connecticut, USA, May 13th and 14th, May 2026.

4. Jana, D., and Mahajan, S.N., Laboratory Testing of Historic Mortars: Part 1 – A Close Look to a 200-year-old Historic Clay-Lime Mortar, The Masonry Society Journal, Vol 42, No. 1, pp. 1-15, Dec. 2024.

5. Jana, D., and Mahajan, S.N., Laboratory Testing of Historic Mortars: Part 2 – Microstructure of a Historic Feebly-Hydraulic Lime Mortar Containing Silica Flour, The Masonry Society Journal, Vol 42, No. 1, pp. 16-35, Dec. 2024.

6. Jana, D., Cracking and crumbling of concrete blocks in County Donegal, Ireland: A holistic approach from case studies on deleterious effects of open microstructure of blocks, phyllite aggregate, pyrrhotite oxidation, paste carbonation, lime leaching, and internal sulfate attacks, Proceedings on 1st International Conference on Iron-Sulfide Reactions in Concrete Quebec City, edited by Benoît Fournier, Josée Duchesne, Rodolfo Castillo Araiza, Andreia Rodrigues, and Pierre-Luc Fecteau,| Université Laval Campus | Canada | May 14th – May 17th pp. 34-38, May 2024.

7. Jana, D., Preventing Pyrrhotite Damage in Concrete - Proposal for a Performance-based Testing Protocol, Concrete International, American Concrete Institute, Vol. 46, No. 5, pp. 42-47, May 2024.

8. Jana, D., Concrete Deterioration from the Oxidation of Pyrrhotite: A State-of-the-Art Review, in "Pyrite and Pyrrhotite" Michael L.J. Maher (editor), pp. 137-221, Nova Science Publishers, Inc., 2023.

9. Jana, D., Cracking of residential concrete foundations in eastern Connecticut, USA from oxidation of pyrrhotite, Case Studies in Concrete Construction, Vol 16, 2022.

10. Jana, D., Pyrrhotite Epidemic in Eastern Connecticut: Diagnosis and Prevention, ACI Materials Journal V 117, No. 1, January 2020.

11. Jana, D., Laboratory Analyses of Masonry Mortars from Fort Washington, Maryland, Fort Washington Masonry Preservation Workshop, Society for the Preservation of Historic Cements, Inc. (SPHC), Prepared for U.S. National Park Services, May 14, 2018.

12. Jana, D., So You Want to Be a Concrete Petrographer? Proceedings of the 39th Conference of International Cement Microscopy Association, ICMA, Toronto, Canada, 2017.

13. Jana, D., Historic Mortars from A National Historic Landmark in The Nation's Capital, Proceedings of the 38th Conference of International Cement Microscopy Association, ICMA, Lyon, France, 2016.

14. Jana, D., and Tepke, D., Corrosion of Aluminum Metal in Concrete – A Case Study – Proceedings of the 32nd Conference on Cement Microscopy, ICMA, New Orleans, Louisiana, 2010.

15. Jana, D., Swimming Pool Plaster Deterioration – Overview and Case Studies - Proceedings of the 30th Conference on Cement Microscopy, ICMA, Reno, Nevada, 2008.

16. Jana, D., Concrete Deterioration from Pyrite Staining, Sewer Gases, and Chimney Flue Gases – Case Studies Showing Microstructural Similarities - Proceedings of the 30th Conference on Cement Microscopy, ICMA, Reno, Nevada, 2008.

17. Jana, D., DEF & ASR in Concrete – A Systematic Approach from Petrography - Proceedings of the 30th Conference on Cement Microscopy, ICMA, Reno, Nevada, 2008.

18. Jana, D., The Great Pyramid Debate, Proceedings of the 29th Conference on Cement Microscopy, ICMA, Quebec City, Canada, 2007, pp. 207-266.

19. Jana, D., Delamination – A State-of-the-Art Review, Proceedings of the 29th Conference on Cement Microscopy, ICMA, Quebec City, Canada, 2007, pp. 135-167.

20. Jana, D., Concrete Scaling – A Critical Review, Proceedings of the 29th Conference on Cement Microscopy, ICMA, Quebec City, Canada, 2007, pp. 91-130.

21. Jana, D., A Round Robin Test on Measurements of Air Void Parameters in Hardened Concrete by Various Automated Image Analyses and ASTM C 457 Methods, Proceedings of the 29th Conference on Cement Microscopy, ICMA, Quebec City, Canada, 2007, pp. 34-69.

22. Jana, D., A New Look to an Old Pozzolan: Clinoptilolite – A Promising Pozzolan in Concrete, Proceedings of the 29th Conference on Cement Microscopy, ICMA, Quebec City, Canada, 2007, pp. 168-206.

23. Jana, D., and Erlin, B., Carbonation as an Indicator of Crack Age, Concrete International, American Concrete Institute, May 2007, pp. 61-64.

24. Jana, D., Application of Petrography in the Concrete Repair Industry, Concrete Solutions 2006, 2nd International Conference on Concrete Repair, St-Malo, Brittany, France, BRE Publications, 2006.

25. Jana, D., Delayed Setting of Concrete – A Petrographic and Chemical Investigation, Proceedings of the 28th Conference on Cement Microscopy, ICMA, Denver, Colorado, 2006, pp. 141-149.

26. Jana, D., Sample Preparation Techniques in Petrographic Examinations of Construction Materials: A State-of-the-art Review, Proceedings of the 28th Conference on Cement Microscopy, ICMA, Denver, Colorado, 2006, pp. 23-70.

27. Jana, D., Petrography – A Powerful Tool for Quality Assurance and Failure Investigation of Construction Materials, International Seminar on Non-Destructive Testing (NDT), India Chapter of American Concrete Institute and ACI (USA), 2006, pp. 117-131.

28. Jana, D., Erlin, B., and Pistilli, M.F., A Closer Look at Entrained Air in Concrete, Concrete International, July 2005, pp. 61-64.

29. Jana, D., and Lewis, R. A., Acid Attack in a Concrete Sewer Pipe – A Petrographic and Chemical Investigation, Proceedings of the 27th Conference Cement Microscopy, ICMA, Victoria, Canada, 2005.

30. Jana, D., and Erlin, B., Delamination: A sometime curse of entrained air, Concrete Construction, January 2005, pp. 101-107.

31. Jana, D., Petrography and Concrete Repair – A Link is Needed, Concrete International, Jan 2005, pp. 37-39.

32. Jana, D., Application of Petrography in Restoration of Historic Structures, 10th Euroseminar on Microscopy Applied to Building Materials, Scotland, 2005.

33. Jana, D., Concrete Petrography – Past, Present, and Future, 10th Euroseminar on Microscopy Applied to Building Materials, Scotland, 2005.

34. Jana, D., Techniques used in petrographic examinations of construction materials – A state-of-the-art review, Abstract for Symposium on Petrographic Techniques for examining hydraulic cements and concretes, American Society for Testing and Materials, Dec. 2004.

35. Jana, D., Concrete, Construction, or Salt – Which Causes Scaling? Part II: Importance of finishing practices, Concrete International, Dec. 2004, pp. 51-56.

36. Jana, D., Concrete, Construction, or Salt – Which Causes Scaling? Part I: Importance of air-void system in concrete, Concrete International, Nov. 2004, pp. 31-38.

37. Jana, D., and Lewis, Richard. Acid attack on PCCP mortar coating, In "Pipeline Engineering and Construction – What's on the Horizon?" John J. Galleher, Jr., and Michael T. Stiff (eds) ASCE Publication, 2004.

38. Erlin, B., and Jana, D., So, what about chloride chemicals applied to concrete surfaces too soon? Some truths and fantasy about chloride de-icing chemicals, Concrete Construction, September 2004, pp. 35-40.

39. Erlin, B., and Jana, D., Forces of Hydration that can cause havoc in concrete - May the force not be with you, Concrete International, Vol. 25, No. 11, Nov. 2003, pp. 51-57.

40. Erlin, B. and Jana, D., "Portland Cement Hydration Commentary", Concrete International, Vol. 25, No. 1, January 2003.

41. Jana, D. and Erlin, B., "Scaling Revisited Commentary", Concrete International, Vol. 23, No. 9, September 2001.

42. Jana, D. (with Sarkar, S.L., and Aimin, Xu) "Scanning Electron Microscopy - X-ray Microanalysis of Concretes", Chapter In "Concrete Technology Today", Ramachandran, V.S., and Beaudoin, J.J (eds), Noyes Publication, NJ, 2001, pp. 231-274.

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44. Jana, D., "Petrography: A Powerful Tool For Solving Common Concrete Problems", Civil Engineering NEWS, March, 40-44 pp, 1997.

45. Jana, D., and Cole, A. A., "Microscopy: A Practical Solution to Concrete Problems", Bulletin of Concrete Industry Board, Vol. 33, No 3, pp 18-22, 1997.

46. Jana, D., and Walker, D., "The Impact of Carbon on Element Distribution during Core Formation", Columbia University, Geochim. et. Cosmochim Acta, Vol. 61, No 13, pp. 2759-2763, Geochemical Society of America, 1997.

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49. Jana, D., and Walker, D., "Core formation in the presence of various C-H-O volatile species", Columbia University, Geochim et. Cosmochim. Acta., Geochemical Society of America, Vol 63, 1999.

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Organized by the Geochemical Society of America, International Geochemical Conference, June 1997.

54. Jana, D., "Petrology and Geochemistry of Deccan Flood Basalts around Simrol and Chorel area", Central India, *M.Sc. Thesis*, University of Calcutta, 1990.

55. Jana, D., "Genesis of high-K refractory magma, Panay, Philippines", *M.S. Thesis*, University of Illinois at Chicago, 1993.

56. Jana, D., "Deccan Flood Basalts - Fossil plume head?" *Indian Journal of Earth Sciences*, Vol. 106, 21-42 pp, 1990.