CURRICULUM VITAE

I. PERSONAL DATA

Name: RAUL ALBERTO BARREA
Date of birth: July 2nd, 1962.
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II. EDUCATION

- Licenciate in Physics (equivalent to a MS degree) – National University of Córdoba, Argentina - 1988.
- Ph. D. in Physics – National University of Córdoba, Argentina - 1995.
- Postdoctoral experience: Laboratorio Nacional de Luz sincrotron LNLS, Campinas Brasil – 1999-2000.

III. CURRENT POSITION

- **Associate Director of Operations, Biophysics Collaborative Access Team- Oct 2004 - current.**
  As Associate Director of the BioCAT my responsabilities are: management of the operations of the BioCAT: including human resources, beamline operations and users programs; management of BioCAT budget; preparation of a new project for the next competitive renewal to be submitted to NIH; assist the director in the recruitment of new staff members; member of the beamtime allocation committee; represent BioCAT before APS/DOE/NIH/IIT or any other agency or institution when the director is not able to participate.

- **Research Associate Professor of Physiscs, Illinois Institute of Technology- April 2005 – current.**
  As a research professor of physics my goal is to develop a scientific program on biological and atomic physics applications of x-ray microbeams at the BioCAT. I regularly teach undergraduate courses at IIT.

- **Beamline scientist responsible for the microfluorescence and microXAFS program at the BioCAT 18ID beamline- Feb 2002 – current.**
  As responsible for this program, I supervise staff members (including scientists and technicians), communicate with our external users (scientists form various institutions and countries) to make sure they receive the technical and scientific support they request in order to perform their experiments succesfully at BioCAT. I'm also involve in equipment development, beamline setup and data analysis. Training is also an integral part of my responsabilities since most of our new users are biologists whom are not familiar with synchrotrons facilities and x-ray fluorescence spectroscopies.

IV. PREVIOUS POSITIONS

1. **Research Assistant Professor of Physiscs, Illinois Institute of Technology- April 2004 – April 2005.** As a research assistant professor of physics my goal was to develop a scientific program on biological applications of x-ray microbeams at the BioCAT. I also taught undergraduate courses at IIT.
2. **Senior Reseach Associate**, BioCAT, IIT, Jan 2002-April 2004. I joined BioCAT in January 2002 to start building the BioXAFS users program. After the beamline was constructed and commissioned, the need for a strong scientific program was the focus of BioCAT activity. During the first two years at BioCAT, I focused my efforts in developping a reliable scientific program for our users. My duties were: responsible for the XAS and microprobe program of the 18ID BioCAT beamline. At the same time I maintained collaborations with groups from my institution of origin and some publications resulted from them.
3. **Assistant Professor of Physics,** National University of Cordoba (UNCba) (1999-2002). During 1999 the federal government increased the National Universities budget allowing most of them to incorporate more professors in varios levels. The position was offered temporarily (2 years term). I was selected among 35 candidates as an Assistant Professor in Physics. In 2001 the position was offered as a permanent Assistant Professor. I was awarded with the position to perform x-ray synchrotron radiation studies in biological samples and atomic physics in rare earth compounds.
4. **Visitant Researcher,** CNPQ (Aug 2000 – Feb 2001). The National Council for the Scientific and technologic development (CNPq) of Brazil funded this position after 1 ½ years of posdoctoral activities at the LNLS. The head of the Spectroscopy and Instrumentation Group was Dr. Helio Tolentino currently at the ESRF. The project involved the continuation of the posdoctoral project plus collaborations with other groups that were new in the XAFS technique for biological samples. The short stay resulted in congress presentations and journal publications.
5. **Posdoctoral fellow**, CLAF – CNPq (Feb 1999- Aug 2000). The Latin American Center of Physics (CLAF) and the CNPq funded this Posdoc position. The position was opened to allow non Brazilian young scientist to perform a 1 ½ year project at the Brasilian Synchrotron Radiation facility (LNLS). The project involved biological XAFS, instrumentation and users service. No biological XAS had been performed at the LNLS before. In this position I pioneer the XAFS studies of very dilute samples at the LNLS. A custom designed 15 elements Camberra germanuim detector was acquired based in the results obtained. Other X-ray fluorescene projects were performed and many publications resulted from them.

6. **Teaching Assistant**, National University of Cordoba (UNCba) (1990-1999). This position is usually offered to graduate student to allow performing their PhD studies while building their teaching experience. After I finished my PhD projet there were no professor positions available at any Colleges in Argentina due to budget reduction and political situation. The teaching assistant position was maintained while duties of an assistant professor were performed.
7. **PhD fellow,** CONICOR (March 1991- February 1994). The Research Council of Cordoba State awarded this fellow position for PhD studies. The award is offered after a contest among several candidates considering the following: project proposal and student cv. The project involved the development of methods and techniques of elemental compositional determination of stainless-steal samples by absolute x-ray fluorescence analysis. The use of standards is often too expensive and sometimes there are no standards available for certain samples. The use of internal standards and the excitation with several photon energies permit the determination of the samples'composition without any standards. The project resulted in several publications.
8. **Research Assistant Associate,** INVAP S.E. (1988-1989).. After I graduate from FAMAF I joined the INVAP (Applied research by their spanish nomenclature) at the Special devices development Group. INVAP is the largest andmost important technology companies in Argentina that builds Nuclear Power Reactors and Plants for Research activities. My previous experience in x-ray detectors was considered essential for this position. My duties were the develpment of gas flow radiation detector for dosimetry and contamination control and monitoring. I left INVAP a year later to continue with my graduate studies at the FAMAF.
9. **Teaching Assistant**, National University of Cordoba (UNCba) (1987). Funded by the National Univesity of Córdoba. This position is offered to last year undergraduated students with high grades to assist professors in teaching activities, especially in laboratory lectures.

V. FIELDS OF INTEREST

- Synchrotron radiation applications in physics and biology. Emphasis in micro-beams.
- X-ray spectroscopy and imaging with micro-beams of biological specimens.
- Molecular and Atomic Physics, information about atoms and molecules obtained experimentally. In particular on rare earth atomic properties.
- Cross sections, photon-atom collisions.
- Synchrotron Instrumentation and techniques.
- General physics, x-ray instrumentation.
- Atomic and molecular physics, applications in biology.

VI. TEACHING EXPERIENCE

1. **Teaching assistant - UNCba**

General Physics II	(200 level)	1st Semester - 1987
General Physics III	(200 level)	2nd Semester - 1987
General Physics I	(100 level)	2nd Semester - 1989
Modern Physics II	(300 level)	1st Semester - 1990

General Physics III*	(200 level)	2nd Semester- 1990
Modern Physics II	(300 level)	1st Semester - 1991
General Physics I	(100 level)	2nd Semester - 1991
Introduction to Physics	(100 level)	1st Semester - 1992
Physics Colloquim	(500 level)	2nd Semester - 1992
General Physics II	(200 level)	1st Semester -1993
Special Course III	(500 level)	2nd Semester - 1993
General Physics I*	(100 level)	1st Semester - 1994
Physics Colloquim	(500 level)	2nd Semester- 1994
General Physics I*	(100 level)	1st Semester - 1995
Physics Laboratory II*	(200 level)	2nd Semester- 1995
Physics Laboratory I*	(200 level)	1st Semester - 1996
Physics Laboratory II*	(200 level)	2nd Semester- 1996
Modern Physics II	(300 level)	1st Semester- 1997
Physics Laboratory II*	(200 level)	2nd Semester- 1997
Physics Laboratory I*	(200 level)	1st Semester - 1998
Physics Laboratory II*	(200 level)	2nd Semester- 1998

5. **Assistant Professor of Physics - UNCba.**

General Physics II	(200 level)	1st Semester – 1999
Physics Laboratory I*	(200 level)	1st Semester - 2001
Physics Laboratory II*	(200 level)	2nd Semester – 2001

6. **Research Assistant Professor of Physics – Illinois Institute ofTechnology**

Physics 123 – General Physics I	Spring 2005

7. Research Associate Professor of Physics – Illinois Institute ofTechnology

Physics 123 – General Physics I	Spring 2006
Physics 221 – General Physics II	Fall 2007
Physics 224 – General Physics III	Spring 2009
Physics 348 – Modern Physics	Fall 2009
Physics 123 – General Physics I	Spring 2010
Physics 224 – General Physics III	Summer 2010
Physics 221 – General Physics II	Fall 2010
Physics 123 – General Physics I	Spring 2011

1-5. All these activities were performed at the College of Mathematics, Astronomy and Physics of the National University of Córdoba.

6-7. These activities were performed at the Biological, Chemical and Physical Sciences Department (BCPS) of the Illinois Institute ofTechnology.

(*) These activities were performed at the College of Chemistry of the National University of Córdoba.

Lecturer of the posgraduate course "Methodology and applications of radioisotopes". Organized jointly by the FAMAF, FCQ and FCEFN of the National University of Córdoba. 1993 –1997.

VII. INVITED AND COLLOQUIUM TALKS

1. **R. A. Barrea** (2000), "A brief history of the Latin American Seminars by X-Ray Techniques", Invited Conference, SARX 2000.

2. R.T. Mainardi and **R.A. Barrea** (1994), "Determinación de la emisión espectral de tubos de rayos x de anticátodo de tungsteno a partir de mediciones de intensidades fluorescentes de muestras puras", IV Seminario Latinoamericano de Técnicas de Análisis por Rayos-X SARX'94, Punta de Tralca - Chile - Octubre de 1994.

3. **R.A. Barrea** (1994), "Desarrollo de un método absoluto de análisis por fluorescencia de rayos X", IV Seminario Latinoamericano de Técnicas de análisis por Rayos-X SARX'94, Punta de Tralca - Chile - Octubre de 1994.

4. **Raúl A. Barrea**, Raúl T. Mainardi, Silvina Bengió and Pedro A. Derosa (1995), "FRX por Reflexión-Transmisión: aplicaciones en films delgados", Workshop sobre Fluorescencia de Rayos X con radiación de Sincrotrón: aplicaciones e instrumentación. Fa.M.A.F. UNCba 6 al 8 de Setiembre de 1995.

5. **Barrea, R.A.**, Perez C.A., Ramos A.Y., Tolentino H., Grenón M. and Sánchez H.J (2000), "Zn environment in subgingival Human Dental Calculus by X-Ray Absorption spectroscopy", 10a Reunión Anual de Usuarios del Laboratorio Nacional de Luz Sincrotron, Campinas Brasil - 16 al 18 de Febrero de 2000.

6. **Barrea, R.A.**, Perez C.A., Ramos A.Y., Tolentino H., Grenón M. and Sánchez H.J. (2000), "Zn environment in subgingival Human Dental Calculus by X-Ray Absorption spectroscopy", XXIII Encontro Nacional de Fisica de materia Condensada, São Lorenço, MG, Brasil, 9 al 12 de maio de 2000.

7. **Raúl A. Barrea** (2002), **Physics Colloquium** "Compositional and Structural Characterization of Human Dental Calculus," IIT, February 7, 2002, Life Sciences.

8. **Raul A. Barrea** (2002), "Biological X-ray Absorption Spectroscopy and Non-Crystalline Diffraction at the BioCAT Beamline at the Advance Photon Source", Lawrence Berkeley National Laboratory, Berkeley Spectroscopy Club. 09/25/02.

9. **R. A. Barrea**, J.A. Abraham, H, J, Sánchez, M. S. Grenon, C.A. Perez (2004), "Metal Spatial distribution and incorporation in Human Dental Calculus", Midwest Metal Meeting, June 4-6, 2004, Ann Arbor, MI.

10. **Raul Barrea**, "Copper accumulation in normal and tumor tissues", APS, ANL User Science Seminar. 3/23/07

11. **R. A. Barrea (03/2008), "**Quantitative and chemical speciation imaging of Cu in Prostate Cancer using hard x-ray fluorescence microscopy", Karmanos Cancer Institute ,4100 John R Street, 5 HWCRC, Detroit, MI 48201.

12. **Raul A. Barrea**– The Fiber Crystallography Program at BioCAT, *FiberNet/BioCAT* Fiber Diffraction Workshop ,October 15-17, **2009**, Advanced Photon Source, Argonne, IL.

13. The BioCAT Fast-Scanning High Flux Microprobe, a user facility for Biological X-ray Fluorescence Microscopy and MicroXAS, R. A. Barrea, Workshop on Biological Applications of X-ray Fluorescence Microscopy, Northwestern University, August 13-14, **2010**.

14. Non-Crystalline Diffraction, Scattering and Micro Spectroscopy at the BioCAT Facility at the Advanced Photon Source, R. A. Barrea, Sep 15, **2010**, Physics Department Seminar, National University of Cordoba, Cordoba, Argentina.

15. Non-Crystalline Diffraction, Scattering and Micro Spectroscopy at the BioCAT Facility at the Advanced Photon Source, R. A. Barrea, Sep 24, **2010**, Syncrotron Light National Laboratory, Campinas, Sao Paulo , Brazil.

16. Microsecond Time-Resolved SAXS at the BioCAT Beamline 18ID, Raul Barrea,Rita Graceffa, Sagar V. Kathuria, R. Paul Nobrega, C. Robert Matthews, Liang Guo, Tom Irving and Osman Bilsel, 21st International Congress on X-ray Optics and Microanalysis (ICXOM21) Campinas, São Paulo, Brazil, from 5 to 8 September 2011.

VIII. PUBLISHED AND ACCEPTED PAPERS IN PEER REVIEWED JOURNALS (*Electronic and hard copy versions of published and submitted manuscripts are available upon request.)*

1. R.T. Mainardi and R.A. Barrea (1989), "X Ray Spectral determination by successive modifications of the beam intensity", Nucl. Instrum. and Meth. in Phys. Res. A280, 387 – 391.

2. R.T. Mainardi and R.A. Barrea (1994), "X-Ray fluorescence analysis with elements having overlapped lines", X-Ray Spectrom., 23, 36-39.

3. R.T. Mainardi and R.A. Barrea (1995), "Determination of spectral emission of tungsten target tubes measuring x-ray fluorescence from pure elements", Appl. Radiat. Isot., Vol 46, No 6/7, 497-498.

4. "Development of methods and procedures for absolute x-ray fluorescence analysis", (1995), PhD thesis, School of Mathematics, Astronomy and Physics – National University of Cordoba - Argentina.

5. R.T. Mainardi and R.A. Barrea (1996), "Indirect Method of X-Ray Spectra Determination by XRF", X-Ray Spectrom. Vol 25, 190-195.

6. R.A. Barrea and R.T. Mainardi (1998), "Standardless XRF Analysis of stainless steel samples", X Ray Spectrom., Vol. 27, No 2, 111-116.

7. R. A. Barrea, P.A. Derosa, S. Bengió and R. T. Mainardi (1998), "Thin sample thickness determination by X-Ray fluorescence Analysis", Radiat. Phys. Chem. Vol. 51, No 4-6, p673.

8. V. Delgado Martinez, R. T. Mainardi, R. A. Barrea, C. Martinez Hidalgo, P.A. Derosa and M. Marco Arboli (1998), "Parametric equation for the efficiency curve of germanium detectors ", X Ray Spectrometry Vol. 27, No 5, 321-324.

9. R. A. Barrea, S. Bengió, P. A. Derosa and R.T. Mainardi (1998), "Absolute Mass Thickness Determination of Thin Samples by X-Ray Fluorescence Analysis", Nucl. Instrum. and Meth. in Phys. Res. B , Vol 143, No 4, 561-568.

10. V. Delgado Martinez, C. Martinez Hidalgo and R. A. Barrea, (2000), "X-Ray Fluorescence analysis by the fundamental parameters method without explicit knowledge of the excitation beam spectrum", X-Ray Spectrometry 29,245-248.

11. R. A. Barrea and E. V. Bonzi (2000), "Experimental Determination of L X-Ray Fluorescence Cross-sections for rare earth at 10.7 keV", Radiat. Phys. and Chem.59 (4), 347-354.

12. R. A. Barrea and E. V. Bonzi (2001), "Rare Earth's Experimental L X-Ray Fluorescence Cross-sections at 13 and 14 keV with Synchrotron Radiation", X-Ray Spectrom., 30, 3-7 .

13. R. A. Barrea and E. V. Bonzi (2001), "L X-Ray Fluorescence Cross-sections for rare earths at 10 and 11 keV with Synchrotron Radiation", Nucl. Instrum. and Meth. in Phys. Res. B, vol No 179/1, 1-10.

14. R. A. Barrea, V. Delgado Martinez and T. Plivelic (2001), "Multielemental X-Ray Fluorescence analysis by using a non-explicit description of the excitation beam", X-Ray Spectrometry, 30, 93-98.

15. H. C. N. Tolentino, A. Y. Ramos, M.C.M. Alves, R. A. Barrea, E. Tamura, J.C. Cezar and N. Watanabe (2001), "A 2.3 to 25 KeV XAS beam line at LNLS", J. Synchrotron. Rad., 8, 1040-1046.

16. R. A. Barrea and E. V. Bonzi (2001),"Lanthanides's Experimental L X-Ray Fluorescence Cross-sections at 9 keV and 12 keV with Synchrotron Radiation", Physica Scripta, 63, 197-202.

17. R. A. Barrea and E. V. Bonzi (2001), "Hf, Ta, W and Re Experimental L X-Ray Fluorescence Cross-sections at 12, 13 and 14 keV with Synchrotron Radiation", Spectrochimica Acta Part B: Atomic Spectroscopy, 56, 2429-2437.

18. Barrea, R.A., Tamura E. and Tolentino H. C. N. (2001), "A Multiwire proportional Counter for XAS Fluorescence experiments", J. Synchrotron Rad., 8, 381-383.

19. Barrea, R.A., Perez C.A., Ramos A.Y (2001), "Zn incorporation in Human Dental Calculus", J. Synchrotron Rad., 8, 990-992.

20. E. V. Bonzi and R. A. Barrea (2002), "Measurement of L X-Ray Fluorescence Cross sections for rare earth at 15.2 keV", Radiat. Phys. and Chem., 63, 129-134.

21. Jose Abraham, M. Grenón, H. J. Sánchez, C. A Pérez, R. A. Barrea (2002), "Spectrochemical Analysis of Dental Calculus by Synchrotron Radiation X-Ray Fluorescence", Anal. Chem. 74 (2): 324-329.

22. R. A. Barrea, C.A. Pérez and H. J. Sánchez (2002), "Hafnium L-subshell Coster–Kronig and fluorescence yields determination by synchrotron photoionization", Spectrochimica Acta Part B 57 999–1008.

23. R. A. Barrea, C.A. Pérez and H. J. Sánchez (2002), "Erbium L-subshell Coster–Kronig and fluorescence yields determination by synchrotron radiation photoionization", J. Phys. B: At. Mol. Opt. Phys. 35 3167–3178.

24. R. A. Barrea, C.A. Pérez and H. J. Sánchez (2003), "Determination of L-subshell Coster–Kronig and fluorescence yields of lanthanum and praseodymium by synchrotron radiation photoionization", Spectrochimica Acta Part B 58 51–62.

25. R.A. Barrea, Perez C.A., Ramos A.Y., Grenón M. and Sánchez H.J (2003), "Distribution and incorporation of Zn in biological calcium phosphates", X-Ray Spectrometry Volume 32, Issue 5 , Pages 387-395.

26. R. A. Barrea, C.A. Pérez and H. J. Sánchez (2004), "Barium L subshells Coster-Kronig and fluorescence yields by the subshell selective photoionization method", Nuclear Instrum. And Methods. In Phys Res. B. 215 308–316.

27. Carlos A. Pérez, Héctor J. Sánchez, Raúl A. Barrea, Miriam Grenón, and José Abraham (2004), "Microscopic x-ray fluorescence analysis of human dental calculus using synchrotron radiation", J. Anal. At. Spectrom., 19 (3), 392 – 397.

28. R. Fischetti, S. Stepanov, G. Rosenbaum, R. Barrea, D. Gore, R. Heurich, E. Kondrashkina, A.J. Kropf S. Wang, Ke Zhang, T.C. Irving and G.B. Bunker (2004), "The BioCAT Undulator Beamline 18ID: A facility for Biological Non-Crystalline Diffraction and X-ray Absorption Spectroscopy at the Advanced Photon Source", J. Synchrotron Rad. 11, 399-405.

29. W.M. Heijboer, P. Glatzel, R.F. Lobo, U. Bergmann, R. Barrea, D.C. Koningsberger, B.M. Weckhuysen and F.M.F. de Groot (2004), "Kβ-detected XANES of framework substituted FeZSM-5 zeolites", J. Phys. Chem. B 2004, 108, 10002-10011.

30. R. A. Barrea, R. Fischetti, S. Stepanov, G. Rosenbaum, E. Black, D. Gore, R. Heurich, M. Vukonich, E. Kondrashkina, A.J. Kropf, S. Wang, K. Zhang, T.C. Irving and G.B. Bunker (2005), "Biological XAFS at the BioCAT 18ID undulator beamline at the APS", Physica Scripta, vol. T115, 867-869.

31. Edgardo V. Bonzi and Raúl A. Barrea (2005), "Experimental L X-ray Fluorescence Cross Sections for Elements with 50 at 7 keV by Synchrotron Radiation Photoionization", X-ray Spectrom, 34, 253–257.

32. Raul A Barrea, Carlos A. Pérez, Tomás S. Plivelic, Edgardo V. Bonzi and Héctor J. Sánchez, (2005), "Anisotropic Angular distribution of Er L x-rays following photoionization by linearly polarized radiation", J. Phys. B: At. Mol. Opt. Phys. 38, 839–852.

33. Jose Abraham, M. Grenón, H. J. Sánchez, C. A Pérez, R. A. Barrea, (2005), "A Case Study of Elemental and Structural Composition of Dental Calculus During Several Stages of Maturation Using SRXRF", Journal of Biomedical Materials Research Part A 75A (3): 623-628, 2005.

34. P. Glatzel, F. M. F. de Groot, O. Manoilova, D. Grandjean, B. M. Weckhuysen, U. Bergmann, and R. Barrea (2005), "Range-extended EXAFS at the L-edge of rare earths using high-resolution fluorescence detection: A study of La in LaOCl", Phys. Rev. B, 72, 014117.

35. J F Collingwood, A Mikhaylova, M R Davidson, C Batich, W J Streit, T Eskin, J Terry, R. A. Barrea, R S Underhill and J Dobson, (2005), "High-resolution x-ray absorption spectroscopy studies of metal compounds in neurodegenerative brain tissue", Journal of Physics: Conference Series 17 (2005) 54–60.

36. Frank M.F. de Groot, Pieter Glatzel, Willem M. Heijboer, Peter A. van Aken, Uwe Bergmann, Raul A. Barrea, Stephan Klemme, Michael Hävecker, Axel Knop-Gericke and Bert M. Weckhuysen (2005) "A multiplet analysis of 1s2p resonant inelastic x-ray scattering, 1s pre-edges and 2p x-ray absorption of iron oxides", Journal of physical Chemistry B 109 (44): 20751-20762 NOV 10 2005.

37. R. A. Barrea, D. Gore, E. Kondrashkina, T. Weng, R. Heurich, M. Vukonich, J. Orgel, M. Davidson, J.F. Collingwood, A. Mikhaylova, and T. C. Irving, (2005), The BioCAT Microprobe for X-ray Fluorescence Imaging, MicroXAFS and Microdiffraction Studies on Biological Samples, Proc. 8th Int. Conf. X-ray Microscopy IPAP Conf. Series, 2006, vol.7, 230-232.

38. J.F. Collingwood, M. Davidson, A. Mikhaylova, J. Terry, R. Barrea, J. Dobson, C. Batich (2005), Directions in Analysis of Large Data Sets from Synchrotron X-ray Studies of Tissue Samples. Conference on Systems Analysis, Data Mining and Optimization in Biomedicine, University of Florida, February 2-4, 2005.

39. Di Chen, Qiuzhi Cindy Cui, Huanjie Yang, Raul A Barrea, Fazlul H. Sarkar, Shijie Sheng, Bing Yan, G. Prem Veer Reddy, and Q. Ping Dou, "Clioquinol, a Therapeutic Agent for Alzheimer's Disease, Has Proteasome-inhibitory, Androgen Receptor Suppressing, Apoptosis-inducing and Anti-tumor Activities in Human Prostate Cancer Cells and Xenografts", Cancer Res 2007; 67: (4). February 15, 2007

40. Barrea RA, Huang R, Cornaby S, Bilderback DH, Irving TC, "High-flux hard X-ray microbeam using a single-bounce capillary with doubly focused undulator beam", J. of Synchrotron Rad. 2009, 16 Pages: 76-82 Part: 1.

41. Raul A Barrea, Di Chen, Thomas C. Irving and Q. Ping Dou, "Synchrotron x-ray imaging reveals a correlation of tumor copper speciation with clioquinol's anti-cancer activity, Journal of Cellular Biochemistry 108:96–105 (2009).

42. Tatjana Paunesku, Stefan Vogt, Thomas C. Irving, Barry Lai, Raul A. Barrea, Jörg Maser, and Gayle E. Woloschak, Biological Applications of X-ray Microprobes, 2009, Vol. 85, No. 8, Pages 710-713.

43. Huang, Rong; Meron, Mati; Kujala, Naresh; Barrea, Raul A, Phase Space Analysis and Experimental Results for Secondary Focusing at X-ray Beamlines, J. Synchrotron Rad. Vol. 17, Pages: 644-52 (2010).

44. Raul A. Barrea, David Gore, Naresh Kujala, Cahit Karanfil, Sergey Kozyrenko, Richard Heurich, Mark Vukonich, Rong Huang, Tanja Paunesku, Gayle Woloschak and Thomas Irving, Fast Scanning-High Flux microprobe for Biological X-ray Fluorescence Microscopy and MicroXAS, J. Synchrotron Rad. Vol. 17, Pages: 522-529, (2010)

45. Leskovjan AC, Kretlow A, Lanzirotti A, Barrea R, Vogt S, Miller LM, Increased brain iron coincides with early plaque formation in a mouse model of Alzheimer's disease, Neuroimage, Vol 55, Issue: 1, Pages: 32-38 (2011).

46. Wolf SE, Muller L, Barrea R, Kampf CJ, Leiterer J, Panne U, Hoffmann T, Emmerling F, Tremel W, Carbonate-coordinated metal complexes precede the formation of liquid amorphous mineral emulsions of divalent metal carbonates Nanoscale, Vol 3, Issue: 3, Pages: 1158-1165, (2011).

47. Naresh Kujala, Cahit Karanfil, and Raul Barrea, High Resolution Short Focal distance Bent Crystal Laue Analyzer for Copper K edge X-ray Absorption Spectroscopy, REVIEW OF SCIENTIFIC INSTRUMENTS Volume: 82 Issue: 6 Article Number: 063106 (2011).

48. Sagar V. Kathuria, Liang Guo, Rita Graceffa, Raul Barrea, R. Paul Nobrega, C. Robert Matthews, Thomas C. Irving, Osman Bilsel, Minireview: Structural Insights into Early Folding Events Using Continuous-Flow Time-Resolved Small-Angle X-Ray Scattering, BIOPOLYMERS Volume: 95 Issue: 8 Special Issue: SI Pages: 550-558 (2011).

49. Eric C. Landahl, Olga Antipova, Angela Bongaarts, Raul Barrea, Robert Berry, Lester I. Binder, Thomas Irving, Joseph Orgel, Laurel Vana, Sarah E. Rice, X-ray diffraction from intact tau aggregates in human brain tissue, Nuclear Instruments and Methods in Physics Research A 649 (2011) 184–187.

50. Edgardo V. Bonzi, Nagappa M. Badiger, Gabriela B. Grad, Raúl A. Barrea, Rodolfo G. Figueroa, Measurement of L X-ray fluorescence cross-sections for elements with $45< Z < 50$ using synchrotron radiation at 8 keV, Nuclear Instruments and Methods in Physics Research B 269 (2011) 2084–2089.

IX. PRESENTATIONS IN SCIENTIFIC MEETINGS

1. R.T. Mainardi and **R.A. Barrea** (1987), "Determinación de espectros de tubos de rayos x detectando radiación dispersada a distintos ángulos", A.F.A. 1987 - San Carlos de Bariloche (Argentina).

2. R.T. Mainardi, M.A. Chesta and **R.A. Barrea** (1989), "Dosimetría de rayos x con centelladores plásticos", A.F.A. 1989 - San Luis (Argentina).

3. R.T. Mainardi and **R.A. Barrea** (1991), "Análisis por fluorescencia de rayos x de elementos con líneas superpuestas", A.F.A. 1991 - Tucumán (Argentina).

4. R.T. Mainardi, M.A. Chesta and **R.A. Barrea** (1991), "Dosimetría de radiación con centelladores plásticos", A.F.A. 1991 - Tucumán (Argentina).

5. R.T. Mainardi, M.A. Chesta and **R.A. Barrea** (1991), "Radiation Dosimeters built with plastic Scintillators", ELAF. 1991 - Caxambu (Brasil).

6. R.T. Mainardi and **R.A. Barrea** (1993), "Influencia de la forma espectral de un tubo de rayos x en la intensidad fluorescente", A.F.A. 1993 - Rosario (Argentina).

7. R.T. Mainardi and **R.A. Barrea** (1993), "Generación de formas espectrales de tubos de rayos x a partir de espectros fluorescentes", A.F.A. 1993 - Rosario (Argentina).

8. S. R. Bustos, R.T.Mainardi and **R.A. Barrea** (1994), "Selenium Content Determination in Human Blood By X-Ray Fluorescence", World Congress on Medical Physics and Biomedical Engineering - Rio de Janeiro, Brasil - Agosto de 1994.

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X. LANGUAJES

1. Spanish: native languaje.
2. Portugues: read, write and speak fluently.
3. English: read, write and speak fluently.

XI. STUDENT AND POSTDOCTORAL PROJECT ACTIVITIES

Undergraduate Research Project

1. Tomás S. Plivelic (1995) "Determination of absorption edges for rare earth elements".

2. Silvina Bengió (1996) "Determination of compositon and thickness of thin films by x-ray fluorescence".

3. Silvina Bengió (1996) "Interaction of UV radiation with matter: properties and biological effects".

4. Naresh Kujala (2009-2011), Postodoctoral project, "Design and construction of a Bent Crystal Laue Analyzer for Copper Speciation Studies".

XII. ACTIVITIES AS JOUNAL REFEREE AND BEAMLINE ADVISOR

1. National Synchrotron Light Laboratory LNLS – Advisor of the XAS beamline – year 2000/2004/2009/2010/2011.
2. National Synchrotron Light Laboratory LNLS – Advisor of the XRF beamline – year 2002/03/05/06/07/08/09/2010/2011.
3. X-ray Spectrometry- (referee of several articles years 2001 to 2010)

4. Spectrochimica Acta Part B: Atomic spectroscopy –referee of article year 2002.
5. Spectroscopy Letters –referee of article year 2004.
6. Journal of Physics B: Journal of Physics B: Atomic, Molecular & Optical Physics – referee of articles years 2005/2006/2008/2009.
7. Journal of Structural Biology – referee of articles 2005.
8. Nuclear Instruments and Methods Part B. referee of articles 2009.
9. Acta Biomateralia, referee of aricle 2008.
10. European journal of Physics D: referee of articles 2007.
11. Journal of Analytical Atomic Spectroscopy, referee article 2010.
12. Journal of Biological Inorganic Chemistry, referee of article 2010/2011.

XIII. MEMBER OF THESIS COMMITTEE

1. Member of Thesis Committee: student Pedro A. Derosa. UNCba. 1997.
2. Member of Thesis Committee: student Rodolfo Figueroa UNCba. 2001.

XIV. SERVICE TO DEPARTMENT, COLLEGE AND UNIVERSITY

1. Counselor at the High Council of the National University of Cordoba. Period 1996/1998.
2. Coordinator of the College Building distribution committee (2001).

XV. ORGANIZATION OF CONGRESS, SEMINARS AND MEETINGS

1. 4th Workshop on Biological Applications of X-Ray Microprobes, 15–16 November 2007 at Northwestern University, Chicago, IL.
2. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'2000, November 19- 24 2000, São Pedro, SP, Brasil.
3. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'98, November 16-20 1998, Huerta Grande, Argentina.
4. Member of the organizing committee of the V Latin American Seminar of Analysis by X-ray Techniques, SARX'96, November 19-23 1996, Cosquín, Argentina.

XVI. RESEARCH PROJECTS AS PRINCIPAL INVESTIGATOR OR CO-PI

1. **The Biophysics Collaborative Access Team –BioCAT. Funded by NIH, PI: Thomas Irving; Co PI Raul Barrea, P41 Grant RR08630. Period 2007-2012.**

2. **High resolution spectroscopy for in vivo copper speciation in prostate and breast. NIH:NCI R21 grant 1R21CA139386-01 (Barrea PI) 04/01/2009 /03/31/2012 $182,352.**

3. **X-ray fluorescence microscopy studies on tumor Cu at various developmental stages. PI: Barrea. NIH Pending**

4. **Raul A. Barrea**, (1997-1998), "Characterization of thin films by synchrotron radiation x-ray techniques", Funded by: LNLS, Campinas, SP, Brasil and CONICOR.

5. **Raul A Barrea** (1997-1998), "Determination of Experimental fluorescence cross-sections", funded by: LNLS, Campinas, SP, Brasil and CONICOR.

6. **Raul A. Barrea** (1999-2000), "Determination of M shell experimental fluorescence cross sections of heavy elements by synchrotron radiation techniques", Funded by: LNLS, Campinas, SP, Brasil and CONICOR.

7. **Raul A. Barrea** (1999-2000), "Determination of L shell fluorescence cross-section by synchrotron radiation techniques", Funded by: LNLS, Campinas, SP, Brasil and SeCyT.

8. **Raul A Barrea** (1999-2000), "Studies of the metal adsorpion in human dental calculus by X-ray absorption spectroscopy", Funded by: LNLS, Campinas, SP, Brasil and CLAF.

9. Hector J. Sánchez, and **Raúl A. Barrea** (1999-2000) "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence ", Funded by CONICOR.

10. Hector J. Sánchez, and **Raúl A. Barrea** (2000-2002), "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence ", Funded by SeCyT – UNC..

11. Hector J. Sánchez, and **Raúl A. Barrea** (2001-2002) "Non conventional analysis of trace and ultra-trace elements in biological samples by X-ray fluorescence", funded by CORDOBA SCIENCE AGENCY.

12. **Raul A. Barrea** (2000-2002), "Studies of the angular distribution of L shell emissions", funded by: LNLS, Campinas, SP, Brasil, and SECYT.