### Publications of Prof. M. Á. Alario-Franco

**Author or co-author** of more than 350 research papers that have been cited more than 5.180 times. Factor H: 37.

Co-author of four patents (One sold to industry)

**Co-author** (with J.L.Vicent) of the only book on Superconductivity in the Spanish Language (Ediciones EUDEMA1991).

Author of a Monograph: *De Superconductores y Otros Materiales* (1993) Editor: Real Academia de Ciencias de España.

**Editor of Book:** *"La Ciencia del Estado Sólido"*. UIMP Santander. Eds. Real Academia de Ciencias de España (1984).

Co-editor of five Books of Proceedings:
\*Reactivity of Solids: Elsevier 1992.
\*Solid State Chemistry of Inorganic Materials Symposium. MRS Fall Meeting,
Boston 2002 (Co-edited with S. Whittingham Nobel Prze in Chemistry (2019)

Translator of two scientific books to the Spanish language:

*\*With A. Mata: "Modern approach to inorganic chemistry"* (Bell, C. F.; Lott, K. A. K.) Butterworths, London (1966): *"Un esquema moderno de la química Inorgánica"*. *Editorial Alhambra. Madrid 1969.* 

**\*\*"L'èvolution des idees en physique".** Albert Einstein & Léopold Infield –Prologue de Louis de Broglie". (1938) "La evolución de las ideas en física". Editorial Gredos 1967. Associate Editor Microscopy, Microstructure and Analysis, Bull. Mater. Sci.; Materials Reearch Bulletin

Member of Scientific Board: J. Solid State Chem.; J. Mater. Chem.; Eur. J. Inorg. Chem.; Solid State Sci. & Anales de Química (1974-1978) ...

**Referee** for numerous Journals in the Field of Solid-State Science (Physics, Chemistry and Materials

### A recent Monograph:

### Proceedings of the international symposium "Superconductivity and Pressure: A Fruitful Relationship on the Road to Room Temperature Superconductivity". May, 21-22 - 2018. Madrid - Spain

Editor: Prof. Miguel Ángel Alario-Franco. UCM Madrid (SPAIN). <u>https://www.fundacionareces.es/fundacionareces/es/publicaciones/listado-de-</u> <u>publicaciones/proceedings-of-the-international-symposium-superconductivity-and-pressure-a-</u> <u>fruitful-relationship-on-the-road-to-room-temperature-superconductivity.html?tipo=2</u>





### **Promotion of Scientific Culture.**

Science Director in El Escorial UCM Summer School (1991-5).

General Director in El Escorial UCM Summer School (1996-8).

**Promoter of Course** and yearly **speake**r, "*Science for all*" in the Spanish Royal Academy of Sciences (2004-18) –Many of these lectures are in *You tube* in the web page of the *Real Academia de Ciencias Exactas, Físicas y Naturales (www.rac.es)*. Mediateca:

Alario.

Uncountable lectures for the Public Understanding of Sciences in Spain along the years / many in Mexico and some in USA.

# **Some much-cited Publications**

TITLE CITED BY YEAR					
X-ray photoelectron spectroscopic studies of CrO2 and some related chromium compounds					
I Ikemoto, K Ishii, S Kinoshita, H Kuroda, MAA Franco, JM Thomas					
Journal of Solid State Chemistry 17 (4), 425-430	276	1976			
Hexagonal versus perovskite phase of manganite					
JS Zhou, JB Goodenough, JM Gallardo-Amores, E Morán,					
Physical Review B 74 (1), 014422	212	2006			
The ASnO3 (A= Ca, Sr) perovskites					
A Vegas, M Vallet-Regi, JM González-Calbet, MA Alario-Franco					
Acta Crystallographica Section B: Structural Science 42 (2), 167-172	189	1986			
Oxygen vacancy ordering in $Ba_2YCu_3O_{7-x}$ around $x=0.5$					
C Chaillout, MA Alario-Franco, JJ Capponi, J Chenavas, P Strobel,					
Solid state communications 65 (4), 283-286,	160	1988.			

Crystallization behavior of zirconium oxide gels		
MJ Torralvo, MA Alario, J Soria		
Journal of Catalysis 86 (2), 473-476,	150,	1984.
A family of non-stoichiometric phases based on Ba <sub>2</sub> YCu <sub>3</sub> O <sub>7-<math>\delta</math></sub> : $\delta$ ( $0 \le \delta \le 1$ )		
MA Alario-Franco, C Chaillout, JJ Capponi, J Chenavas, M Marezio		
Physica C: Superconductivity 156 (3), 455-460	139	1988
Oxygen-vacancy ordering in the $Ba_2YCu_3O_{7-x}$ ( $0 \le x \le 1$ ) superconducting sy	stem.	
C Chaillout, MA Alario-Franco, IJ Capponi, J Chenavas, JL Hodeau,		
Physical Review B 36 (13), 7118	119	1987
Microstructural study of La <sub>6</sub> sLi <sub>6</sub> sTiO <sub>2</sub>	,	1907
A Várez F Garcia-Alvarado F Morán MA Alario-Franco		
Journal of Solid-State Chemistry 118 (1) 78-83	107	1995
Crystal Structure and Microstructure of Some La 22 Liz. TiO2 Oxides: An F	vamnle i	of the
Complementary Use of Flectron Diffraction and Microscopy	<i>Aumpi</i> e 0	y me
S García Martín MA Alaria Franco H Ebrenberg I Podríguez Carvaial		
Journal of the American Chemical Society 126 (11) 3587 3596	103	2004
<b>B</b> rownmillouite type microdomains in the calcium lanthanum ferrites:	105,	2004.
Drownmuter the encroacomains in the calcium tuninanum jerrites. $C_{a} \perp a_{a} = E_{a} O_{a} \rightarrow \perp 2 < x < 1$		
$Cu_x Lu_{1-x} FeO_{3-y}$ . I. $3 > x > 1$ MA Aleria Errange IM Conzelez Cellet M Vellet Degi IC Greenier		
Januaria of Salid State Chamistry 40 (2) 210 221	101	1002
Journal of Solid-State Chemistry 49 (2), 219-231	101	1983
A new HISC family: the copper analogs of the single-layer Hg or II copper	oxiae	
superconductors		
MA Alario-Franco, C Chaillout, JJ Capponi, JL Tholence, B Souletie	07	1004
Physica C: Superconductivity 222 (1-2), 52-56	97	1994
Lithium-ion conductivity in the novel $La_{1/3-x}Li_{3x}NbO_3$ solid solution with per	rovskite-i	related
structure		
S Garcia-Martin, JM Rojo, H I sukamoto, E Moran, MA Alario-Franco	05	1000
Solid State Ionics 116 (1-2), 11-18,	95	1999
	, ,	1777.
Magneto-thermal and dielectric properties of biferroic YCrO <sub>3</sub> prepared by co	ombustio	n
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<ul> <li>Magneto-thermal and dielectric properties of biferroic YCrO<sub>3</sub> prepared by cosynthesis</li> <li>A Durán, AM Arévalo-López, E Castillo-Martínez, M García-Guaderrama, Journal of Solid-State Chemistry 183 (8), 1863-1871,</li> <li>Report from the third workshop on future directions of solid-state chemistry solid-state chemistry and its impact in the physical sciences</li> <li>MG Kanatzidis, KR Poeppelmeier, S Bobev, AM Guloy, SJ Hwu,</li> <li>Progress in Solid State Chemistry 36 (1-2), 1-133,</li> <li>Phonons in Nd<sub>2-x</sub>Ce<sub>x</sub>CuO<sub>4</sub></li> <li>ET Heyen, G Kliche, W Kress, W König, M Cardona, E Rampf, J Prade,</li> </ul>	93, 93, : The stat 84,	2010. tus of 2008.
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## Some of the more interesting publications with some comments: A personal view

### **Reliable Method for Determining the Oxidation State in Chromium Oxides**

Ángel M. Arévalo-López and Miguel Á. Alario-Franco Inorg. Chem., **2009**, 48 (24), pp 11843–11846 **Publication Date (Web):** November 24, 2009 (Article) **DOI:** 10.1021/ic901887y

We show that an appropriate analysis of the electron energy loss spectra in relation to the Cr-O bonds gives a reliable methodology to obtain the oxidation state in chromium oxides. It is based on the energy difference between the  $Cr L_3$  and O K edges, ...



<u>Ahead of the Lanthanide Contraction; Pressure and Ionic Size in the Synthesis of</u> <u>MSr<sub>2</sub>RECu<sub>2</sub>O<sub>8</sub> (RE = Rare Earth, M = Ru, Cr, Ir): a Gaussian Relation</u>

*M. Á.* Alario-Franco, *R. Ruiz-Bustos and A. J. Dos Santos-García* Inorg. Chem., **2008**, 47 (14), pp 6475–6481

Publication Date (Web): June 14, 2008 (Article)

DOI: 10.1021/ic7020676

We have been working for some time on the synthesis at high pressure ( $P \le 12.5$  Gpa) and high temperature ( $T \le 1400$  K) of new materials of the type MSr<sub>2</sub>RECu<sub>2</sub>O<sub>8</sub>(RE = Rare Earth), which formally derive from YBCO (i.e., CuBa<sub>2</sub>YCu<sub>2</sub>O<sub>7</sub>) by replacing the [Cu–O<sub>4</sub>] ...



# <u>New Materials Derived from Ybco: CrSr<sub>2</sub>RECu<sub>2</sub>O<sub>8</sub> (RE = La, Pr, Nd, Eu, Gd, Tb, Dy, Y, Ho, Er, Lu)</u>

*Rocío Ruiz-Bustos, Myriam H. Aguirre, and Miguel Á. Alario-Franco Inorg. Chem.*, **2005**, *44* (9), pp 3063–3069

Publication Date (Web): March 29, 2005 (Article)

**DOI:** 10.1021/ic048929y

Eleven new oxides, derived from yttrium barium copper oxide by replacing the squareplanar copper  $[Cu-O_4]$  of the basal plane of the triple perovskite-based structure with octahedral  $Cr^{IV}$ , have been prepared at high pressure and temperature. Their crystal ...



### Increasing the Structural Complexity of Chromium(IV) Oxides by High-Pressure and High-Temperature Reactions of CrO<sub>2</sub>

*E. Castillo-Martínez, A. M. Arévalo-López, R. Ruiz-Bustos and M. A. Alario-Franco Inorg. Chem.*, **2008**, 47 (19), pp 8526–8542

Publication Date (Web): September 29, 2008 (Article)

**DOI:** 10.1021/ic801015b

This work presents an overview of a series of increasingly complex oxides synthesized from  $CrO_2$ , under high-pressure and high-temperature conditions, having  $Cr^{4+}$  in octahedral coordination. Although the emphasis is on the structure and microstructure of ...



# <u>Influence of Structural (Cation and Anion) Order in the Superconducting</u> <u>Properties of Ozone-Oxidized Mo<sub>0.3</sub>Cu<sub>0.7</sub>Sr<sub>2</sub>RECu<sub>2</sub>O<sub>y</sub> (RE = Yb, Tm, Gd, Nd, and Pr)</u>

Xabier Martínez de Irujo-Labalde, Esteban Urones-Garrote, Susana García-Martín, and Miguel Ángel Alario-Franco

Inorg. Chem., 2018, 57 (19), pp 12038–12049

Publication Date (Web): September 19, 2018 (Article)

**DOI:** 10.1021/acs.inorgchem.8b01594

The influence of rare earth (RE) elements on superconducting properties of the transition element (TE)-substituted  $TE_xCu_{1-x}Sr_2RECu_2O_y$  cuprates has not been sufficiently emphasized so far. In the case of molibdo-cuprates with the general formula  $Mo_{0.3}Cu_{0.3}...$ 



7

#### Spinel to CaFe<sub>2</sub>O<sub>4</sub> Transformation: Mechanism and Properties of β-CdCr<sub>2</sub>O<sub>4</sub>

Ángel M. Arévalo-López, Antonio J. Dos santos-García, Elizabeth Castillo-Martínez, Alejandro Durán and Miguel Á. Alario-Franco Inorg. Chem., **2010**, 49 (6), pp 2827–2833 **Publication Date (Web):** February 15, 2010 (Article)

**DOI:** 10.1021/ic902228h

The CdCr<sub>2</sub>O<sub>4</sub> spinel transforms to a 10.6% denser new polymorph of the CaFe<sub>2</sub>O<sub>4</sub>-type structure at 10 GPa and 1100 °C. This new polymorph has a honeycomb-like structure because of double rutile-type chains formed by  $[Cr-O_6]$  edge-shared octehedra.



Core-level photoemission spectra of Mo<sub>0.3</sub>Cu<sub>0.7</sub>Sr<sub>2</sub>ErCu<sub>2</sub>O<sub>y</sub>, a superconducting perovskite derivative. Unconventional structure–property relationships Dalton Trans., 2015,44, 10795-10805\_Sourav Marik, Christine Labrugere, O. Toulemonde, Emilio Morán and M. A. Alario-Franco:

The correlation between the critical temperature,  $T_c$ , and the apical oxygen distance, the buckling angle and the charge transfer energy ( $\Delta$ ) with the oxidation, in the family of materials: <u>Mo<sub>0.3</sub>Cu<sub>0.7</sub>Sr<sub>2</sub>ErCu<sub>2</sub>O<sub>y</sub></u>.



### <u>High-pressure synthesis, structural and complex magnetic properties of the ordered</u> <u>double perovskite Pb<sub>2</sub>NiReO<sub>6</sub> Dalton Trans.</u>, 2014,43, 1117-1124

Teodora Stoyanova-Lyubenova, Antonio J. Dos santos-García, Esteban Urones-Garrote, María José Torralvo and Miguel Á. Alario-Franco.

Wasp-waisted hysteresis loops are originated from the AFM/FM competing interactions occurring in the compositional microdomains of the Pb<sub>2</sub>NiReO<sub>6</sub>perovskite.



### Structural Studies on A-Cation-Deficient Perovskite-Related Phases. I. Th $Nb_4O_{12}$ . Thorium/Vacancy Ordering in Slow-Cooled Samples

BY M. A. Alario-Franco

Departamento de Quimica Inorgánica, Facultad de Ciencias Quimicas, Universidad Complutense, Madrid-3, Spain

I. E. GREY,\* J. C. JOUBERT AND H. VINCENT

Laboratoire de Cristallographie, CNRS, 166 X, 38042 Grenoble Cedex, France

and M. Labeau

Institut National Polytechnique de Grenoble, Laboratoire de Génie Physique, BP 46, 38042-St Martin d'Heres, France



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[001] zone axis electron diffraction pattern



Microdomain texture



**Reciprocal lattice** 

THE "STARS" COME FROM THE PERIODICITY OF THE WALLS OF THE PERPENDICULAR CRYSTALLINE MICRO-DOMAINS



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# On the structure and microstructure of "PbCrO<sub>3</sub>"

### Ángel M. Arévalo-López, Miguel Á. Alario-Franco\*

Departamento de Química Inorgánica, Facultad de Químicas, Universidad Complutense de Madrid, 28040 Madrid, Spain Received 4 June 2007; received in revised form 11 September 2007; accepted 15 September 2007 Available online 22 September 2007



Fig. 12. (a) Model of the structure of PbCrO<sub>3</sub> obtained by electron microscopy and diffraction. The occupation factor of the Pb atoms has been scaled so as to make it more clearly visible. Lead is yellow, chromium is purple and oxygen is red (color online). (b) Single domain of a schematic representation of the microdomain texture of "PbCrO<sub>3</sub>". (c) Intergrowth of domains in different orientations.