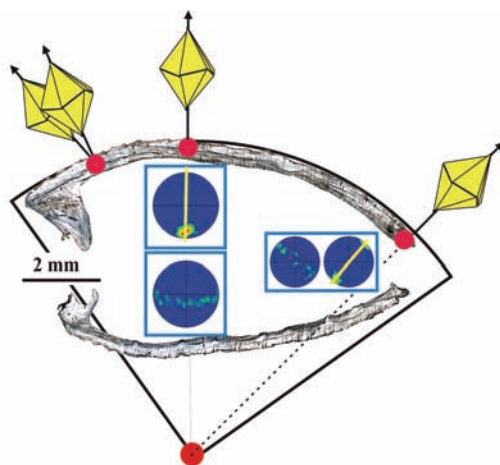
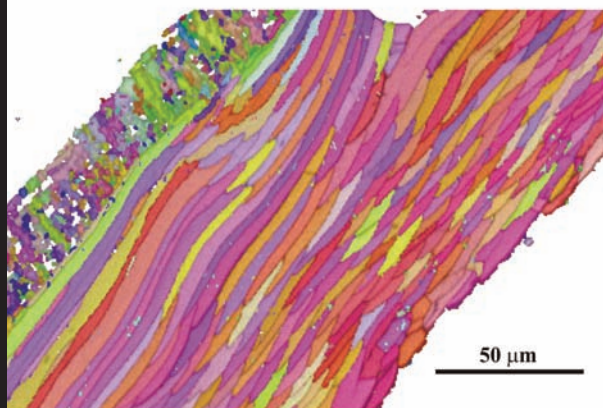


XXX Reunión de la Sociedad Española de Mineralogía

Workshop on Biominerals and Biomineralization Processes

Madrid, 13 - 16 de Septiembre 2010



Editores:

Lurdes Fernández Díaz

José Manuel Astilleros García-Monge

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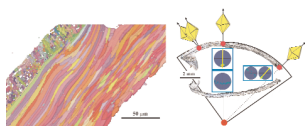
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Cover photo

Image on the left (Figure EBSD-map): EBSD-orientation-map of the ventral valve of the modern brachiopod *Notosaria nigricans*. Different colours within the map highlight different crystal orientations within the investigated region of the sample. Well observable are the microcrystalline primary and the fibrous shell layers with the stacks

of longitudinally and transversely cut fibres (Griesshaber *et al.* 2010, *Seminarios SEM volumen 07*).

Image on the right (Figure shell with pole figure diagrams and crystal orientations): EBSD data sets are displayed in pole figure diagrams as crystal axes orientations (c- and a-axes for calcite). In the case of modern brachiopods the direction of calcite c-axes points radially outward and follows the curvature of the valve. Thus, the calcite of the brachiopod shells shows a pronounced pattern of crystallographic preferred orientation which connects the molecular scale structure with the shell's architecture on the macroscopic scale (Schmahl *et al.* 2010, *Seminarios SEM volumen 07*).



**Seminarios de la Sociedad de Española
de Mineralogía**

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Foreword

The fascination with biominerals has accompanied humankind since the dawn of self-consciousness. Our prehistoric ancestors already appreciated the joined qualities of beauty and functionality in biomaterials. The intricate and subtle morphologies of shells and other external skeletons drew the imagination of artists and the curiosity of naturalists over centuries. During the last decades of the 20th century a renewed interest for biomaterials arose among scientists working in a variety of fields. The remarkable mechanical properties of biominerals are inspiring the research of many material scientists and engineers. Geologists, geochemists, mineralogists and astrobiologists work together in the study of biomaterials to unravel the conditions prevailing in the Earth along its history. Understanding the complex interplay between the organic and inorganic factors that control the formation of biominerals represents one of the most challenging goals of modern mineralogy. *Biominerals and Biomineralization Processes*, the seventh volume in the Seminar series of the Spanish Mineralogical Society, is aimed at providing the field of young and senior researchers an updated and comprehensive view of recent advances in biomineralization. The volume collects the invited lectures presented at the workshop held in Madrid on the 13th of September of 2010. The first chapter is a comprehensive introduction to the hierarchical architecture of most biomaterials, from which their mechanical properties derive. In the second chapter, a detailed description of microstructural and crystallographic characteristics of shells is presented. The third and fourth chapters discuss the “vital effect” on the chemical signatures of biominerals and the applicability of these signatures as proxies for paleoclimate reconstructions. A review of the state of the art about magnetite crystallization mediated by bacteria is presented in the fifth chapter. Finally, the sixth chapter reviews the impact of contaminants on biomineralization processes and the suitability of biominerals as indicators of contamination levels.

The workshop and the contents of this volume have been possible thanks to the authors, who have accepted our invitation to participate with generosity and willingness. We are sincerely grateful to these scientists for their comprehensive contributions. The Spanish Mineralogical Society has been privileged by their presence in this event.

Different institutions have provided logistic and financial support to the organization of this Workshop and the preparation of this volume. We acknowledge the Spanish Ministry of Science and Innovation, the Higher Council for Scientific Research (CSIC), the Gómez-Pardo Foundation, the Madrid School of Mines (UPM), the Geo-Minero Museum (IGME), and the Faculty of Geology (UCM) for this support.

Lurdes Fernández Díaz
José Manuel Astilleros García-Monge

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