EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office via the User Portal:
https://wwws.esrf.fr/misapps/SMISWebClient/protected/welcome.do

Deadlines for submission of Experimental Reports

Experimental reports must be submitted within the period of 3 months after the end of the experiment.

Experiment Report supporting a new proposal ("relevant report")

If you are submitting a proposal for a new project, or to continue a project for which you have previously been allocated beam time, you must submit a report on each of your previous measurement(s):

- even on those carried out close to the proposal submission deadline (it can be a *"preliminary report"),*
- even for experiments whose scientific area is different form the scientific area of the new proposal,
- carried out on CRG beamlines.

You must then register the report(s) as "relevant report(s)" in the new application form for beam time.

Deadlines for submitting a report supporting a new proposal

- 1st March Proposal Round - **5th March**
- 10th September Proposal Round - **13th September**

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report in English.
- include the experiment number to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.

ESRF	**Experiment title:** Investigating the effect of amino acid incorporation into the crystal lattice of magnetite: from structure to magnetic properties	**Experiment number**: CH-5906
Beamline: ID-22	**Date of experiment**: from: 07/07/2021 to: 12/07/2021	**Date of report**: 24/07/2022
Shifts: 12	**Local contact(s)**: Catherine Dejoie	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Boaz Pokroy* – Department of Materials Science and Engineering, Technion – Israel Institute of Technology.

Iryna Polishchuk* – Department of Materials Science and Engineering, Technion – Israel Institute of Technology.

Arad Lang* – Department of Materials Science and Engineering, Technion – Israel Institute of Technology.

Lotan Portal* – Department of Materials Science and Engineering, Technion – Israel Institute of Technology.

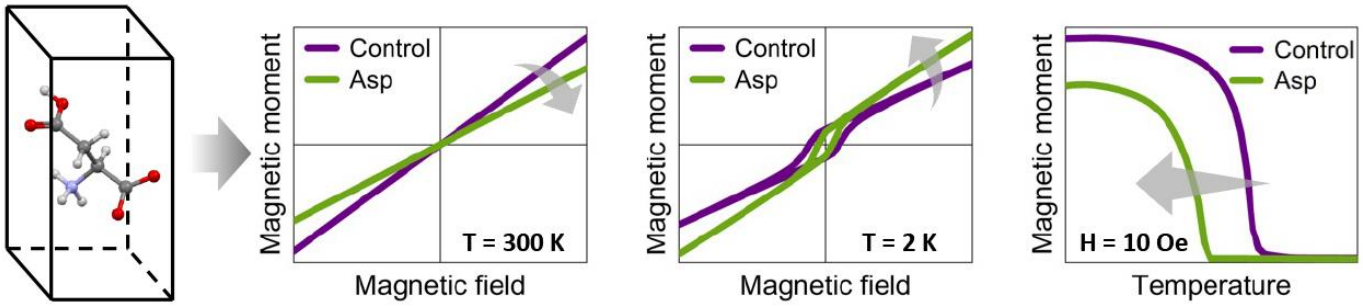
Giuseppe Falini – Laboratory University of Bologna Department of Chemistry "Giacomo Ciamician".

Report:

Published work:

Lang, A., Polishchuk, I., Confalonieri, G., Dejoie, C., Maniv, A., Potashnikov, D., Caspi, E. N., & Pokroy, B. (2022). Tuning the Magnetization of Manganese (II) Carbonate by Intracrystalline Amino Acids. *Advanced Materials*, https://doi.org/10.1002/adma.202201652

Abstract: Incorporation of organic molecules into the lattice of inorganic crystalline hosts is a common phenomenon in biomineralization, and has been shown to alter various properties of the crystalline host. Taking this phenomenon as our source of inspiration, we show herein that incorporation of specific single amino acids into the lattice of manganese (II) carbonate strongly alters its inherent magnetic properties. At room temperature, the magnetic susceptibility of the amino-acid-incorporating paramagnetic MnCO3 decreases, following a simple rule of mixtures. When cooled below the Néel temperature, however, the opposite trend is observed, namely an increase in magnetic susceptibility measured in a high magnetic field. Such an increase, accompanied by a drastic change in the Néel phase transformation temperature, results from a decrease in MnCO3 orbital overlapping and the weakening of superexchange interactions. To our knowledge, this is the first time that the magnetic properties of a host crystal have been tuned via the incorporation of amino acids.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