Adsorption and precipitation of iron on marine bacteriophage PWM3a-P1

C. J. DAUGHNEY[1], X. CHÂTELLIER[2], A. CHAN[3], P. KENWARD[4], D. FORTIN[4] AND C. A. SUTTLE[3]

[1] Institute of Geological & Nuclear Sciences, Lower Hutt, New Zealand (c.daughney@gns.cri.nz)
[2] Géosciences Rennes, University of Rennes, Rennes, France (xavier.chatellier@univ-rennes1.fr)
[3] Department of Earth and Ocean Sciences, University of British Columbia, Vancouver, Canada (achan@eos.ubc.ca, suttle@eos.ubc.ca)
[4] Department of Earth Sciences, University of Ottawa, Ottawa, Canada (p_kenward@hotmail.com, dfortin@science.uottawa.ca)

Biological colloids are important in the marine iron cycle, because they can act as sites for adsorption and/or heterogenous mineral nucleation. Biocolloids such as bacterial cells are known to adsorb and act as sites for the precipitation of dissolved iron, but the possible role played by marine viruses in the distribution of iron has not been investigated.

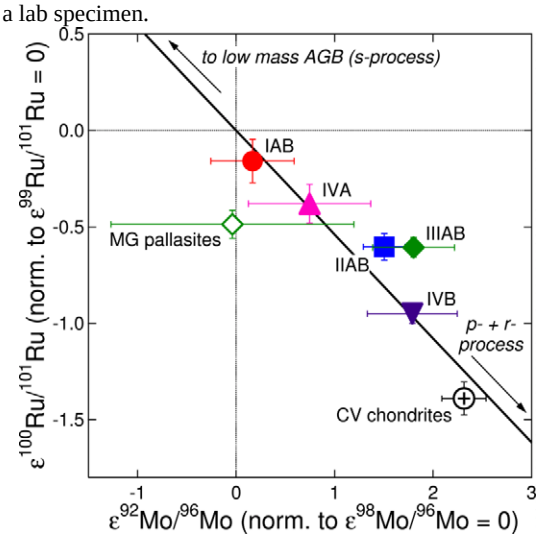
In this study, we investigated the adsorption and precipitation of iron on a marine bacteriophage (PWM3a-P1). Acid-base titrations and zeta potential measurements were used to characterise the tendency of the viruses to interact with protons, and biomineralisation experiments were conducted to evaluate iron-virus interactions. The titration and zeta potential data indicated that the viruses displayed carboxyl, phosphoryl and amino functional groups, and suggested that these sites were distributed throughout the volume of the viruses. The iron precipitation experiments suggested that these functional groups were capable of binding iron. TEM images of precipitates formed in the presence and in the absence of the viruses showed similar morphology and mineralogy, suggesting that the viruses acted primarily as passive sites of heterogenous nucleation. The results of this investigation indicate that viruses may comprise a small but significant reservoir of iron in marine environments.

Correlated Mo and Ru anomalies in differentiated meteorites

N. DAUPHAS[1], B. MARTY[3], A. M. DAVIS[1,2], L. REISBERG[3], & R. GALLINO[4]

[1]Enrico Fermi Institute, [2]Dept. of Geophys. Sci., Univ. of Chicago, Chicago, IL 60637 (dauphas@uchicago.edu)
[3]CRPG, Vandoeuvre-lès-Nancy, France
[4]Dipartimento di Fisica Generale, Universita' di Torino, Torino, Italy

As material accreted on the ecliptic plane, vaporization and large scale turbulence homogenized the protosolar nebula, resulting in approximately uniform isotopic composition. At a planetary scale, tiny isotopic anomalies survived but the origin of these variations is still obscure. Iron meteorites provide important clues for addressing this question. Indeed, they bear information on planetesimals that were up to 10^{22} times bigger than a lab specimen.



Isotopic anomalies were first identified in iron meteorites for Mo [1]. Similar patterns, although of much larger magnitude, were also observed in primitive meteorites [2]. These were interpreted as reflecting variation in the contribution of *s*-process material and were thought to reflect large scale gas-dust decoupling in the nebula [1, 2]. Ru isotopic anomalies were reported recently in differentiated meteorites [3]. As illustrated in the associated figure, the Ru isotopic anomalies detected by [3] correlate with the anomalies detected for molybdenum [1, 2]. The correlation is exactly that expected for variation of the *s*-process contribution assuming that molybdenum and ruthenium condensed stoichiometrically in the hypothetical host phase (the line in the figure is not a regression through the data but is the theoretically expected mixing line between *s*-process material synthetized in low mass AGB stars and the sun). These isotopic anomalies carry important information on planetary genetics [4].

[1] Dauphas N. *et al.*, (2002) *ApJ* **565**, 640-644. [2] Dauphas N. *et al.*, (2002) *ApJ* **569**, L139-L142. [3] Chen J.H. *et al.*, (2003) *LPSC* **XXXIV**, #1789. [4] Dauphas N. *et al.*, (2002) *GRL* **29(6)**, 1084, doi:10.1029/2001GL014237.