ESRF	**Experiment title:** ZEOLITES AS NANO-REACTORS FOR THE ENVIRONMENT: EFFICIENCY, SELECTIVITY AND STABILITY IN THE ADSORPTION OF DRUGS FROM CONTAMINATED WATERS	**Experiment number**: 08-02-662
Beamline: BM08	**Date of experiment**: from: 19 nov 2011 to: 21 nov 2011	**Date of report**: 17/01/2015
Shifts: 9	**Local contact(s)**: Francesco Dacapito	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Rossella Arletti - Dipartimento di Scienze della Terra, Università di Torino, Italy

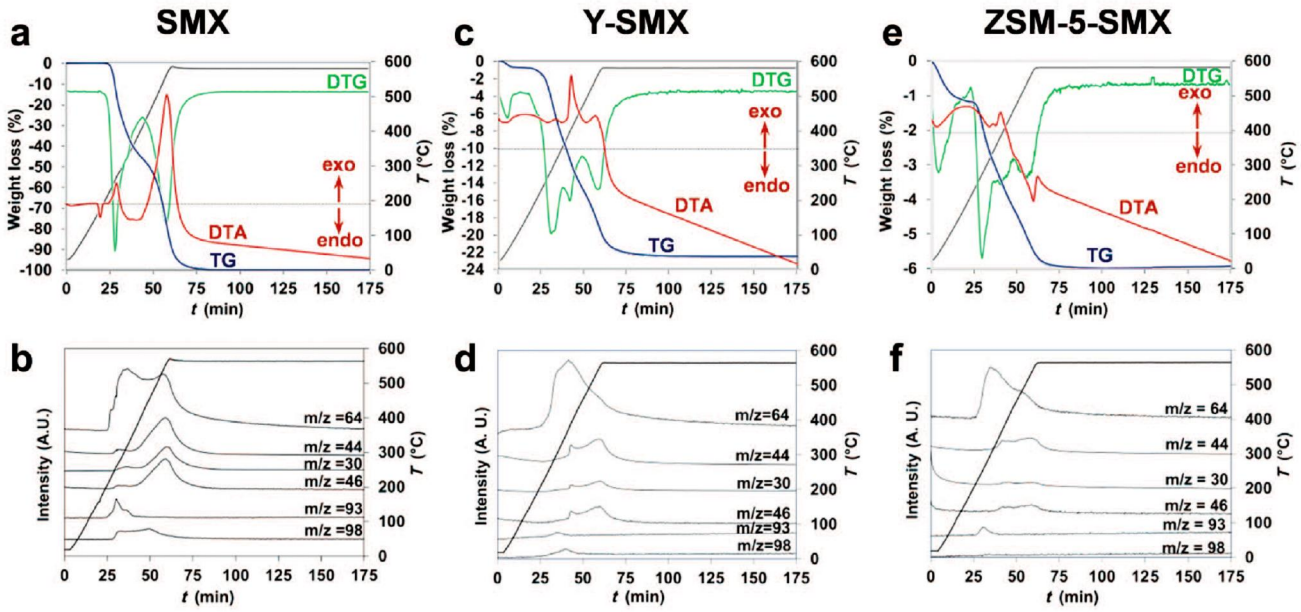
Simona Quartieri - Dipartimento di Fisica e Scienze della Terra, Università di Messina, Italy

Giovanna Vezzalini - Dipartimento di Scienze Chimiche e Geologiche, Università di Modena e Reggio Emilia, Italy

Lara Gigli - Dipartimento di Scienze della Terra, Università di Torino, Italy

Report:

The thermal regeneration of sulfamethoxazole (SMX)-loaded Y and ZSM-5 zeolites was studied using a combined in situ high-temperature synchrotron X-ray powder diffraction and thermal degradation study. The evolution of the structural features was monitored in real time in the 30575ºC temperature range by full-profile Rietveld analysis. SMX thermal degradation pathways into high-silica zeolite antibiotic adducts, as well as the release of evolved species are similar to those for pure SMX. The adsorption/desorption process occurs without any significant loss of zeolite crystallinity, though slight deformations to the channel apertures are observed. Regenerated zeolites regain almost perfectly óbareô (i.e. unloaded) material unit-cell parameters and only a slight memory effect, in terms of structural deformations induced by the process, is registered in the channel geometry. Interestingly, these changes do not affect the adsorption properties of the regenerated samples, which are able to re-adsorb comparableamounts of antibiotic molecules as in the first adsorption cycle.



Full details of the results in:

Leardini L., Martucci A., Braschi I., Blasioli S., Quartieri S. (2014)Regeneration of high-silica zeolites after sulfamethoxazole antibiotic adsorption: A combined in situ high-temperature synchrotron X-ray powder diffraction and thermal degradation study, Mineralogical Magazine, vol.78, p.1141-1159, 2014