

## Kinetics of DNA adsorption and desorption from goethite

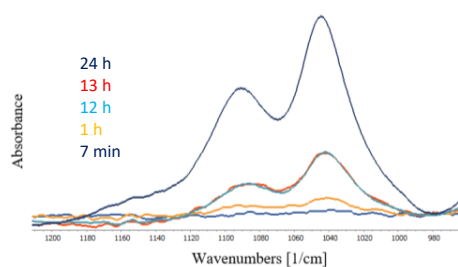
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Antibiotic resistance is one of the biggest threats to global health, food security and development that has stopped being only a clinical issue and became an environmental one.<sup>1</sup> In soils, free DNA (not part of biomass) degrades in a few weeks but DNA bound to a mineral substrate can survive for several hundred thousands of years.<sup>2</sup> This extended DNA longevity provided by minerals increases the possibility for spread of antibiotic resistance among bacterial soil populations. However, the parameters controlling ad/desorption kinetics of DNA at minerals as a function of environmental conditions are lacking making it difficult to understand the propagation of the mineral-adsorbed antibiotic resistance genes. We used liquid-cell ATR-FTIR<sup>3</sup> to determine DNA ad/desorption coefficients from goethite (image) as a function of pH and ionic strength. We have combined the results with AFM where we monitored the adsorption of DNA on various goethite faces. We demonstrate that goethite has a high affinity for both double and single stranded DNA and that the complexes are stable in a range on environmental conditions. The implication is that DNA adsorbed to goethite has potential to be stable for long periods of time, increasing the chance for propagation of antibiotic resistance genes across environments.



1. EUR/RC61/14 (2011). 2. Slon, V. *et al. Science* **356**, 605–608 (2017). 3. Krumina, L. *et al. Chemical Geology* **427**, 54–64 (2016).