

**Title:** Geochemical and isotopic characterization of Chromium in Campania environmental matrices.

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### **Proposal**

The PhD research project will be focused on development of the Chromium isotopic systematics in order to identify chemical-physical factors of geological and anthropic nature that directly or indirectly control the availability of hexavalent Chromium in different environmental samples. In detail, groundwaters will be analyzed because they are the main source of drinkable water. The study area is the Solofrana river valley (Campania), an area characterized in the past few decades by river pollution caused by wastewaters delivered by leather tanning plants operating close to the river. Recent geochemical studies on various environmental samples (soil, sediment, etc.) of the Sarno River basin report high Chromium concentrations in all samples. It is so fundamental to understand geochemical, natural and anthropic processes that cause the Chromium presence in groundwaters, in particular the occurrence of the highly toxic hexavalent Chromium. A possible step forward in the knowledge of the reduction processes is the determination of the Chromium isotopic composition on various environmental samples of the study area that will be processed during the PhD period, aiming at providing a useful tool to monitor hexavalent Chromium reduction for environmental risk mitigation.

### **Research Program**

The research work during the three PhD years will be focused on the determination of the Chromium isotopic composition on various environmental samples of the Solofrana river valley, today still one of the most polluted European rivers, in the framework of a research project funded by the Federico II University. The first activity will be a bibliographic study on the pollution of the Solofrana area, focused on the presence of the hexavalent Chromium and on the monitoring results of the Campania agency for environmental protection (ARPAC). The following activity will be the identification of

significant sampling sites distributed along the Solofrana river valley in one or more surveys in the selected area. Then the setup of Chromium isotope determination line will be set up, consisting of: 1) preparation of chromatographic columns using suitable ion exchange resins; 2) preparation of high-purity reagents at controlled normality; 3) setup of the analytical procedure to determine the Chromium isotopic composition by thermal ionization mass spectrometry. The first attempt will be made on samples with known Cr isotopic composition (international standards) in order to test the procedure and then the isotopic analyses of the selected samples will be carried out. The results of the research will be presented to national/international meetings and published in high-impact scientific journals. The different activities will be distributed in the course of the three years according to the following scheme.

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Activity	1-2	3-4	5-6	7-8	9-10	11-12	1-2	3-4	5-6	7-8	9-10	11-12	1-2	3-4	5-6	7-8	9-10	11-12	
Bibliographic research	x	x																	
Database of Cr data in the selected area	x	x																	
Survey aimed at identifying sites for groundwaters and soil sampling			x	x															
Laboratory activity to set up Cr isotope procedure				x	x														
Sampling and preparation for chemical analyses								x	x	x									
Geochemical and isotopic analyses										x	x	x							
Data elaboration											x	x	x						
Courses	x	x					x	x											
Presentation of project results to meetings						x				x	x			x	x				
Presentation of project results in scientific articles						x					x	x							
Dissertation writing																x	x	x	

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