különböző időszakban (tél-tavasz-nyár) gyűjtöttük, a 2 hetet lefedő időszakonként minimum 23 db mintát, délelőtti és délutáni időpontokban, hétköznap és hétvégén egyaránt. A gyűjtött mintákat együttműködésben az Utrechti Egyetemmel dolgozzuk fel, ahol a gázkoncentráció és radiokarbon-mérések (^{14}C) az Atommagkutató Intézetben, az üvegházhatású gázok (CO_2, CH_4) stabilizotóp-arányméréseit pedig az Utrechti Egyetemben lesznek végrehajtva. Az előadásban bemutatásra kerülnek a nemzetközi együttműködésben született eredmények. Az izotóparány-mérésekből következtetni lehet a gázok forrásaira, mivel egyes kibocsátó források sajátos izotóparánnyal rendelkeznek, mintegy ujjlenyomat, információt hordoznak keletkezésükről. A radiokarbon-mérések segítségével következtethetünk a fosszilis kibocsátások mértékére a különböző időszakokban.

Environmental geochemical study of degradation of cementitious materials in a wastewater treatment plant (Transdanubian)

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Wastewater treatment plants are constructed from concrete because of its low cost and high strength. However, due to aggressive conditions in sewage, concrete materials in wastewater treatment plants are affected by deterioration leading to high cost of rehabilitation. Concrete deterioration is mainly caused by chemical and microbiological attacks. The study focuses on investigating the deterioration of cement materials in sewage pumps and sand traps to understand the possible degradation mechanisms.

An in-situ experiment was conducted for exposing 12 cement specimens to the sewage pump and sand trap location of a Hungarian wastewater treatment plant. Four cement samples were removed from the locations each month for physical observation and geochemical analysis. The deteriorated samples were observed by visual, optical, and microscopy, whereas SEM and XRD were used to obtain morphological images and composition of degradation mineral, respectively.

The preliminary results of the study: (A) Changes of surface color for samples exposed in sewage pump from light gray to brown color, whereas the samples in sand trap maintained their original gray color. (B) After 2 months of exposure, samples in sewage pump developed a white, soft and mushy assemblage on its surface unlike in sand trap. This was confirmed by SEM and XRD analysis to be gypsum ($CaSO_4.2H_2O$), ettringite

($Ca_6Al_2(OH)_{12}(SO_4)_3 \cdot 26H_2O$) and thaumasite ($Ca_3Si(OH)_6(CO_3)(SO_4) \cdot 12H_2O$). (C) After 3 months of exposure to both locations, amount of degradation related minerals for samples exposed in sewage pump was 2 to 3 times higher than those exposed in sand trap as measured by XRD.

Enhancing CO_2 Photo-Hydrogenation Efficiency Using ZnO-Doped Fe Catalysts Synthesized via Hydrothermal and Wet Impregnation Methods

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In this study, iron-doped zinc oxide (ZnO) photocatalysts were synthesized using both hydrothermal and wet impregnation methods, and evaluated for their effectiveness in CO2 photoreduction under both UV and visible light irradiation. X-ray diffraction (XRD), transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS), nitrogen adsorption-desorption, and UV–vis diffuse reflectance spectroscopy (UV-DRS) were used to characterize the samples.
The results showed that Fe wet impregnation significantly improved the photocatalytic activity compared to Fe-doped ZnO through hydrothermal treatment, and the doping efficiency of 4% iron was found to be the most effective in both scenarios. The iron-doped ZnO samples exhibited unique properties such as light absorption and electron transfer mechanism, leading to enhanced activity for CO2 photoreduction towards the reverse water gas shift (RWGS) reaction.
The study highlights the potential of iron-doped ZnO photocatalysts for efficient CO2 conversion, especially towards the RWGS reaction, and provides insights into the optimal synthesis methods and doping conditions.

Green transition of Oil and Gas Companies

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The green transition of oil and gas companies is essential to ease the climate change, the energy industry is one of the biggest contributors to the Greenhouse Gas (GHG) emissions. Their operation and products are polluting our environment directly and indirectly. My research is mainly based on comparative case studies of big, medium and small oil and gas corporation. I am collecting capital expenditures data of those 6 companies on green projects in the last 7 years and also strategies which lead us