

Invited Seminars - Lunedì 17 Giugno alle ore 10:30 in Aula 155/4

Dr. Kun V. Tian (*Sapienza University of Rome*)

BUCK\$\$\$ - Brine Utilisation for CO₂ to be 'Koncretely' \$equestered, \$olidified and \$tored

Carbon capture, utilisation, and storage (CCUS) is the process of capturing CO₂ from fuel combustion and/or industrial processes, its transport and use as a resource to create products (CCU), else its permanent storage in geological reservoirs (CCS). CO₂ mineralisation is a CCU process that can be used to store and utilise CO₂ to produce valuable minerals. These of growing use in the cement industry, responsible for ~8% of man-made CO₂ equivalent emissions and holds the highest carbon intensity of any industry per revenue unit. CO₂-mineralisation to generate carbonates (eg. MgCO₃) via aqueous formation represents a huge opportunity for the utilisation of captured CO₂ (CCU). Carbonate materials can be used in infrastructure materials, revenues of which are expected to reach \$1 trillion/yr. by 2030. Mg²⁺ sources (brine, silicate deposits) are widespread and plentiful - enough to sequester all anthropogenic emissions for the next >1000 years; potentially for widespread use in CO₂-negative construction materials, particularly once CCU policy is more fully evolved specifically for carbon utilisation. The talk covers this area of CCU and the specific work ongoing to employ novel approaches and technologies to achieve CO₂-mineralisation with high efficacy at bulk scales in the industrial context.

Biography

Kun V. Tian is CEO and co-founder of MEH Srl, a Rome-based innovative enterprise, focusing on R&D & Innovation in CCUS and waste repurposing. KVT is also a senior researcher at Sapienza U., and associated with McMaster U. and UBC in Canada. Building on >15 years' experiences in materials science, at the interface of science, engineering and industry, KVT has become an expert in cementitious materials and their development. This, together with her now >5 years' experiences in CCUS, bulk mineral-carbonisation, physico-chemical and mechanical properties of industrial/agricultural wastes feedstock and mineralization products, including CO₂ reactor design and fabrication, mineralisation-product usage and development. She currently leads and coordinates the BUCK\$\$\$ industrial project funded under CETPartnership, EU-Horizon (Pillar II CL5).

Per informazioni rivolgersi al Dr. Henry Adenusi

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Prof. Gregory A. Chass (*Queen Mary University of London*)

Vibrational and entropic contributions driving function & specificity in phase, physical and chemical transformations

A quantification of material and molecular function & specificity lies in the discipline-transcending concept of the rate constant. This entropy sensitive metric allows for the precise description of a wide scope of phenomena, including phase changes, surface adsorption, interfacial effects, isotope and reactant half-lives, catalysis, chemical transformation and biomedical activity. Entropic contributions from dynamical motions (translations, rotations, vibrations) are directly tied to the structure and environs of these systems and thus their accurate resolution is essential. The talk focuses on case studies for cementitious materials, mineral- carbonation and molecular activity to illustrate the dependence of functionality and specificity on vibrational contributions, especially cooperative, coupled and anharmonic modes in the THz-regime (i.e. far-infrared), as characterised by neutron scattering, THz-spectroscopy and DFT modeling.

Biography

Gregory A. Chass is CTO and co-founder of MEH Srl, a Rome-based innovative enterprise, focusing on R&D & Innovation in CCUS and waste repurposing. GC is also a reader (professor) of Physical Chemistry at Queen Mary University of London, UK, and associated with McMaster U. and UBC in Canada. Building on ~25 years' experiences in chemistry, and ~15 years in materials science, at the interface of science, engineering and industry, GC has become an expert in disordered materials and their optimisation. This, together with her now >5 years' experiences in CCUS, bulk mineral carbonisation, physico-chemical and mechanical properties of industrial/agricultural wastes feedstock and mineralization products, including CO₂ reactor design and fabrication, mineralisation-product usage and development. GC also has >15 years experience using neutron and muon beamlines and large-scale facilities for characterizing structure & dynamics in disordered and amorphous materials & liquids (soft condensed matter), industrial catalysts, anti-oxidants and energy materials.

Per informazioni rivolgersi al Dr. Henry Adenusi