CIVIL AND ENVIRONMENTAL ENGINEERING

PNRR - Investigation of pore scale phenomena for Underground Gas Storage through Micromodels

Funded By	MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
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Context of the research activity	Underground porous media are complex multiphase systems, where the behavior at the macro-scale is affected by physical phenomena occurring at the pore-scale. The understanding of pore-scale fluid flow is fundamental to reducing the uncertainties associated to the characterization and understanding of reservoirs and groundwater systems. Microfluidics provides synthetic tools, often referred to as micromodels, able to mimic porous media networks and offer direct visualization of flow pehnomena. Progetto finanziato nell'ambito del PNRR - PNRR M4C2, Investimento 3.1 - Avviso n. 3264 del 28/12/2021 - IR0000027 Infrastructure for ENergy TRAnsition aNd Circular Economy @ EuroNanoLab (iENTRANCE@ENL) - CUP B33C22000710006
Objectives	This PhD activity will be divided in both laboratory tests and modelling of observed phenomena. Experiments will consists mainly in imposing two phases flow conditions into properly designed micromodels with the aim of: characterizing the microscale flow parameters; observing and characterizing physical phenomena (such as phase trapping, capillary and viscous behavior) under different flow conditions (identified/defined based on capillary number, mobility ratio, Reynolds number, etc.). Based on observation and characterization, numerical and/or analytical models will be defined, implemented and calibrated. The final goal will be the upscaling of the parameters from microscale to macroscale in order to provide a deep understanding and a suitable characterization of the flow behavior for underground energy storage purposes.
Skills and competencies	A demonstrated background in fluids properties characterization and description. A knowledge of petrophysical properties, rock-fluids interaction

for the development of the activity	properties, multiphase flow phenomena, and main methodologies adopted in reservoir engineering for the study of underground saturated geological formation from both static and dynamic point of view.