

Physical properties of CO₂ to support carbon capture utilisation and storage (CCUS)

Simona Lago^{1*}, Stephanie Bell², Alexander Fateev³, Federica Gugole⁴, Susanne Kruppa⁵, Solmaz Nadiri⁶, Roland Span⁷, David Vega-Maza⁸

¹ Istituto Nazionale di Ricerca Metrologica (INRIM), Turin (Italy)

² National Physical Laboratory (NPL), Teddington (UK)

³ DTU Chemical Engineering (Denmark)

⁴ VSL B.V. (Netherlands)

⁵ Air Liquide Forschung und Entwicklung GmbH (Germany)

⁶ Physikalisch-Technische Bundesanstalt (PTB), Braunschweig (Germany)

⁷ Ruhr-University Bochum, Thermodynamics, Bochum (Germany)

⁸ TERMOCAL Research Group, University of Valladolid (UVA), Valladolid (Spain)

*Corresponding Author: s.lago@inrim.it

The European Commission's Green Deal aims to achieve carbon neutrality by 2050, with carbon capture, utilisation and storage (CCUS) named as a priority. CCUS begins by removing CO₂ from emissions before release. However, CCUS is not 100 % emission-free, since some products based on utilised CO₂ will reemit CO₂ over time and CO₂ slip is a relevant factor for all capture and transport technologies. In this context, the MetCCUS project (Metrology Support for Carbon Capture Utilisation and Storage – 21GRD06) within the European Partnership on Metrology will contribute to measurement technologies that are required to meet the targets of the Green Deal.

One workpackage of the MetCCUS Project addresses the metrological infrastructure needed to support the design, the monitoring and the maintenance of industrial infrastructures dedicated to carbon capture, transportation, utilisation and storage. A new capability for the calibration of hygrometers, an innovative sensor concept for the on-line monitoring of phase transitions in CO₂ mixtures, standard test methods for evaluating the susceptibility of pipeline materials to corrosion and improved thermodynamic models, based on original experimental measurements of thermophysical properties, will be delivered. A brief overview of the corresponding activities in MetCCUS is given.