

Third Laureate Fundamental Research



- **Research Work Title:** Hybrid material for CO₂ capture: design, performance and stability
- **Researcher:** Prof. Abdelhamid Sayari
- **Country:** Tunisia and Canada
- **Field:** Chemistry
- **Scientific Affiliation:** University of Ottawa, Ottawa, Canada



Abstract:

Mitigating the effect of greenhouse gases is one of the most challenging problems facing humanity. We discovered and patented novel amine-supported hybrid materials for CO₂ capture from industrial gases with unprecedented efficiency. Multifaceted investigations addressing the following issues were carried out (i) importance of the pore diameter, length and volume, (ii) optimization of amine-grafting conditions, (iii) CO₂ adsorption capacity and rate, (iv) selectivity toward CO₂, (v) adsorption-desorption cycling, (vi) effect of moisture, (vii) oxidative degradation, (viii) CO₂-induced deactivation, and (ix) selective removal of SO₂ in the presence of CO₂. In particular, we discovered and patented the beneficial effect of moisture in terms of enhanced CO₂ uptake because of a more favorable reaction pathway, and increased material stability by preventing the formation of irreversible CO₂-amine linkages. Because of its low energy requirements and high selectivity, adsorption is poised to become the leading technology to recover CO₂ with direct implications on greenhouse gas mitigation.

Biography:

Dr. Abdelhamid Sayari is Professor of Chemistry and Chemical Engineering at the University of Ottawa, Canada, Fellow of the Canadian Institute of Chemistry, and Canada Research Chair (CRC) in Nanostructured Materials. He is also the Founding Director of the Centre for Catalysis Research and Innovation (CCRI). Dr. Sayari received his PhD in heterogeneous catalysis at the University of Tunis in 1980. After a postdoctoral fellowship at the University of Pittsburgh, he moved to the National Research Council of Canada (NRC). In 1990, he became Professor of Chemical Engineering at Laval University in Quebec, and in 2001, he joined the University of Ottawa as a CRC. Dr. Sayari is the Editor of Journal of Molecular Catalysis. He published more than 250 refereed papers, seven book chapters and nine patents, and co-edited four books. He has an h-index of 70 and well over 17500 citations. He has synthesized innovative materials for CO₂ capture with unprecedented attributes.

