Carbon dioxide (CO$_2$) is the main greenhouse gas contributing to climate change, one of the most critical issues that humanity must face in our days. The concentration of CO$_2$ has strongly increased due to the human activity since the industrial revolution and is getting records every year (408 ppm in 2018). CO$_2$ emissions affect directly or indirectly the life on Earth: they contribute to the increase of temperature of the atmosphere, the seas and the continents; to raise the level of the oceans because of ice mass unfrozen; to produce extreme climate conditions; to lose biodiversity and to compromise the human health and food production.

In this thesis, CO$_2$ is not considered as a waste but a source of carbon to be revalorized. Concretely, the main approach followed in this thesis is the conversion of CO$_2$ to sodium carbonate (Na$_2$CO$_3$) for further reuse in the cement or ceramic industry, for example. A novel process based on membrane technology has been proposed in which two consecutive steps (CO$_2$ capture & salt crystallization) are involved.