Polymers with amine groups for carbon dioxide adsorption

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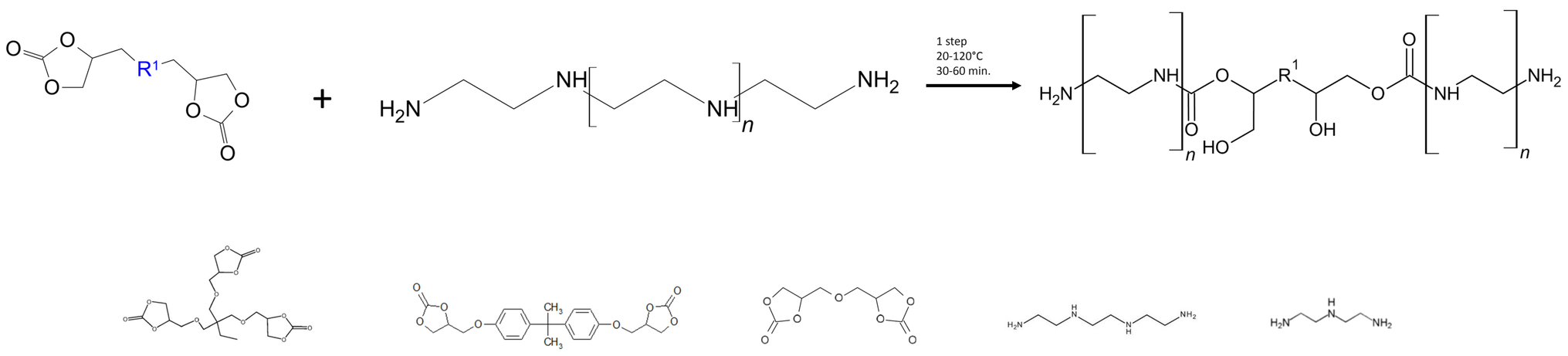
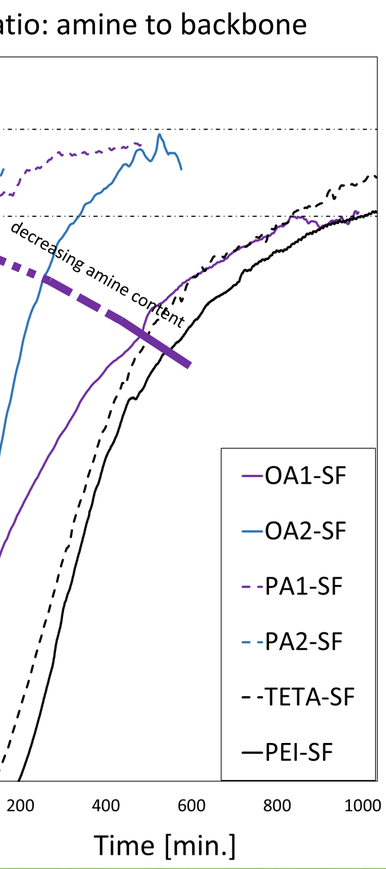
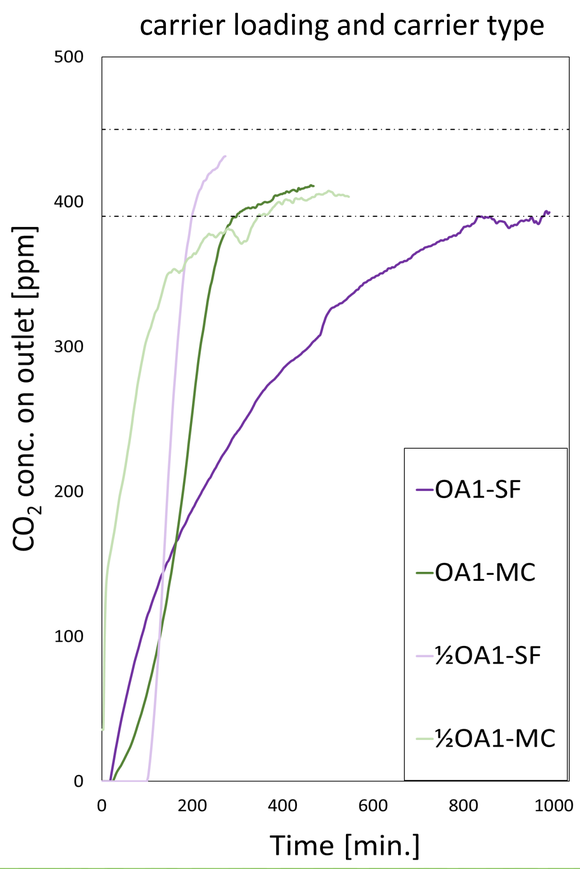
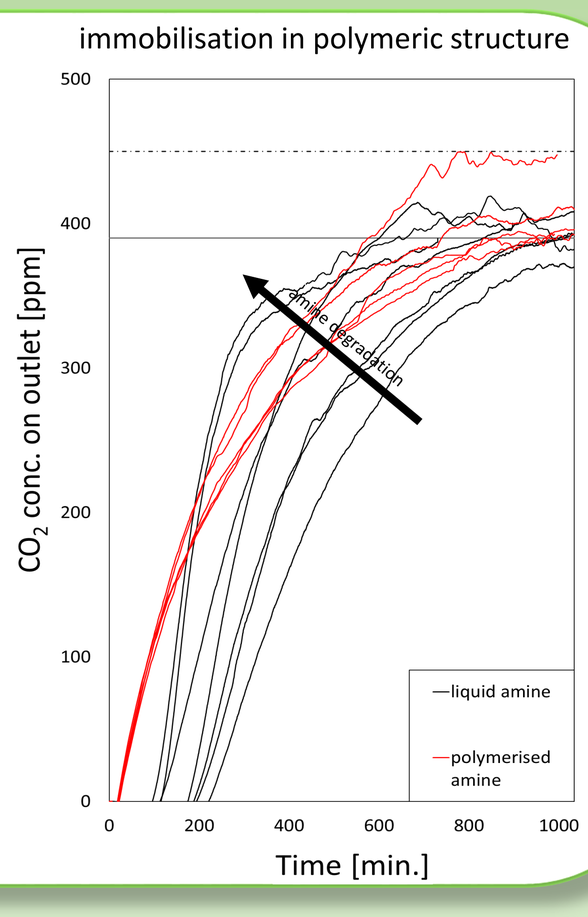
Introduction

Amine solutions are the most common CO_2 absorbents used in the industry, because of simplicity, high selectivity and efficiency. Its drawbacks are corrosiveness, amine leaching, energy demanding desorption and small surface area for adsorbate exchange. In contrast other technologies based on physisorptive porous materials offer high surface area for sorption, lower regeneration energy but in exchange for much smaller selectiveness and capacity. Advantages, of both of those technologies, have systems of amine functionalized porous materials, having high surface area for bonding, robust amine species capable of tuned CO_2 adsorption. Depending on the amine itself, surface bonding mechanism and porous support, sorption capabilities can be adjusted preferably, which was explored in this study.

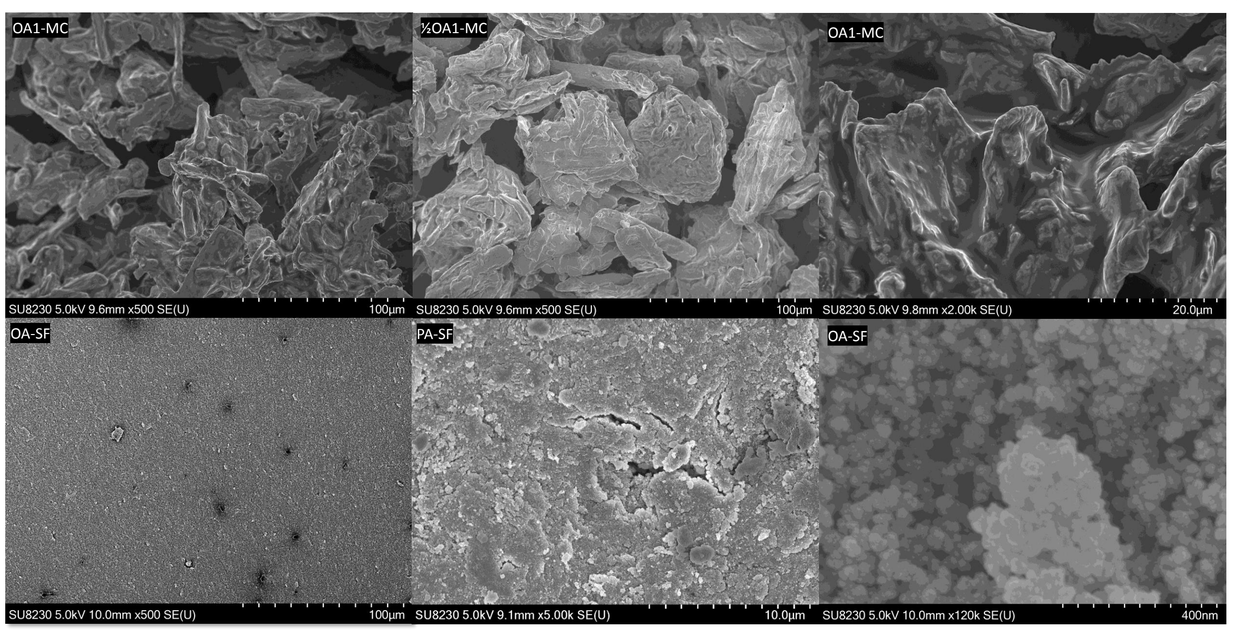








Sorbent type	Absorption Capacity [mg/g_{ads}]	Amine content [%]
OA1-SF	72,6	9,8
OA2-SF	83,5	-
PA1-SF	12,2	7,0
PA2-SF	13,8	-
OA1-MC	85,6	9,8
½OA1-SF	73,0	3,3
½OA1-MC	39,5	3,3
TETA-SF	113,3→56,2	22,6
PEI-SF	89,3→34,2	-



- Poly(hydroxyurethanes) are an interesting solution for the development of CO_2 adsorbents
- Amine groups content has impact on adsorption capacity
- Viscosity of the adsorbing layer affects rate of adsorption and amine efficiency
- Not reachable amine groups are filling up spaces and decrease contact area
- Amine immobilization as polymeric material benefits its thermal and oxidative stability

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