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Novel Self-Regulated Pump (SRP) CO_2 Capture in a CO_2 to Methane system

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Abstract

Curbing CO_2 emissions in an affordable manner is a global issue. Physical absorption a well-established technology for CO_2 separation from other gases. Physical absorption processes are simple; whereby a gas-liquid contactor saturates the solvent and a flash tank regenerates the solvent. CO_2 is absorbed in the physical solvent in the high-pressure gas liquid contactor and flashed out in the medium and low pressure flash tank. The advantage of using a physical solvent is that the CO_2 is absorbed without any chemical reaction involved, thus it can be flashed out easily by reducing the pressure, passing inert gas through the solvent and mild thermal regeneration. Physical absorption is the best operated at low pressure and low temperature as the solubility of CO_2 in the solvent is high at the particular condition. We are reporting for the first time dynamic physical motion based on a fluid pump designed to transfer fluid to the gas-liquid contactor and create turbulence that significantly increases CO_2 adsorption. Using one pump for this purpose creates small bubbles of CO_2 in the liquid and simultaneously compresses the fluid to create drops of solvent that rise into the gas phase of the reactor. The speed of the pump is regulated by an electrical circuit that measures the percentage of CO_2 adsorption and thus allows the system to be optimized independently until saturation is achieved. Although the results are optimized for physical performance, we assume that Concept has an impact on improving results in each type of CO2 adsorption.

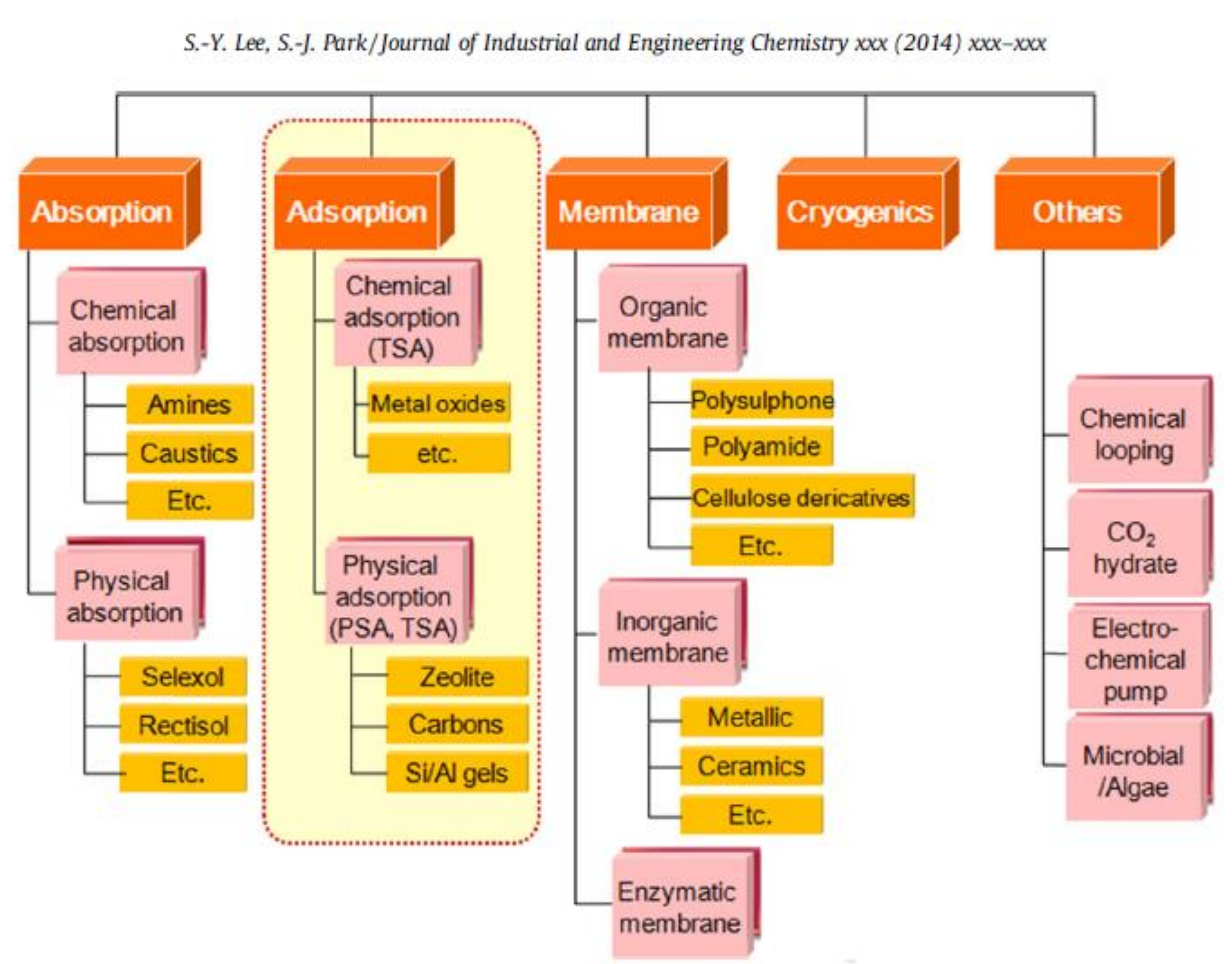

Fig.1 Classification of application technologies for post-combustion capture of CO2.

Innovation of SRP

Nanotechnology today is based on particle size such as powder and their effectiveness in several times of magnitude versus mass or volume. The physical and mathematical affect theory behind it the area of surface that dramatically increases the phenomenon. The bubble and absorption of CO2 method is very dependent on the viscosity of the liquid which makes it difficult for the bubbles and even reduces the babble formation only if the pressure that the bubble can overcome the resistance of viscosity in order to create even single bubbles are from time to time. We are present the concept that SRP that part of reactor can to create saturation, mixing and turbulence in the liquid with nan babbles of CO2 that the physical and chemistry interaction increase exponentially. Additional effect, SRP pumping the liquid that created the effect in the liquid and flow it to spray tower the benefit efficiency of CO2 absorption with created drops. The other effect is thermal conductivity of drops, bobbles and turbulence that releases heat and does not require a cooling system. The speed of the pump is regulated by an electrical circuit that measures the percentage of CO2 adsorption and thus allows the system to be optimized independently until saturation is achieved. Preliminary result shown the saturation arrival time and number of cycles are significantly shortened

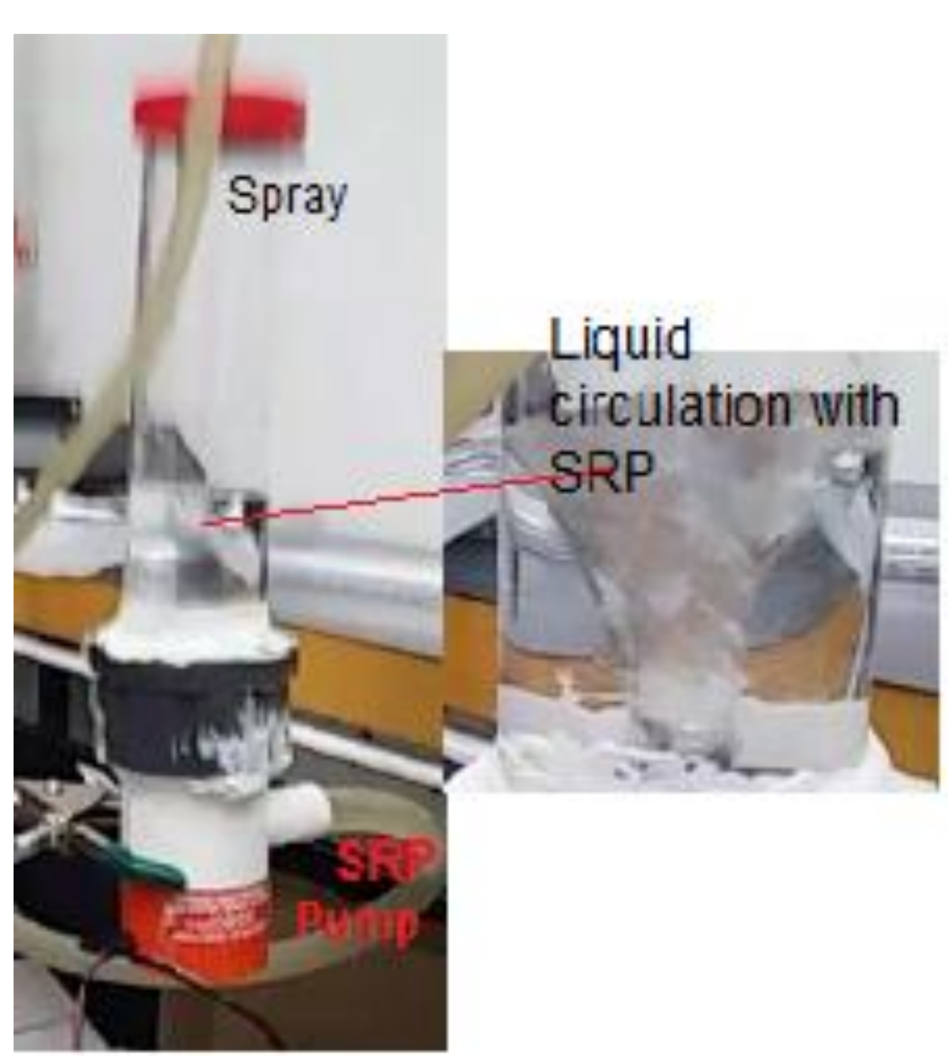

Fig.2 mixing and turbulence by SRP in the MEA solution created nano babbles of CO2 with high area surface that improve the physical and chemical interaction exponentially