Supplementary Information (SI) for Materials Advances.

Environmental Material: CO_2-Adsorbing Clays for Enhancing Soil Fertility and Agricultural Sustainability

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% Yield calculation

Kaolinite surface was modified with an organic modifying agent, CTAB (Cetyltrimethylammonium bromide). The percentage modification yield was 79.21%, calculated by Equation 1. This yield reflects the amount of CTAB incorporated onto the kaolinite surface. Polyethyleneimine (PEI) was then impregnated into the CTAB-modified kaolinite. The impregnation yield calculated using Equation 2. This was 88.69%, which is essential for estimating the sorption sites involved for CO_2 adsorption. Modifying inorganic kaolinite to enhance its compatibility with organic polymers, improving the impregnation process. This modification increases the adsorption capacity by creating more sorption sites, thereby enhancing the potential for CO_2 adsorption.

The percentage yield was calculated in two steps to confirm the success of the reaction:

$$Percentage\ modification\ yield\ = \frac{Mass\ of\ pure\ Kaolinite}{Mass\ of\ CTAB\ modified\ Kaolinite} \times 100 \quad (1)$$

and

$$Percentage\ impregantion\ yield\ = \frac{Mass\ of\ CTAB\ \ Kaolinite}{Mass\ of\ CKP\ composite} \times 100 \quad (2)$$

Table S1. Code and composition of prepared samples

Sr. No	Cod	Composition
1	PK	Pure Kaolinite
2	CKP-0	Cetyltrimethylammonium bromide (CTAB) modified pure Kaolinite
3	CKP-30	30 wt % Polyethyleneimine (PEI) impregnated cetyltrimethylammonium bromide (CTAB) modified pure Kaolinite
4	CKP-50	50 wt % Polyethyleneimine (PEI) impregnate cetyltrimethylammonium bromide (CTAB) modified pure Kaolinite