Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Fabrication of Graphene Oxide/Montmorillonite nanocomposites flexible thin films with improved gas-barrier properties

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1. WVTR measurement technique for the gas-barrier film

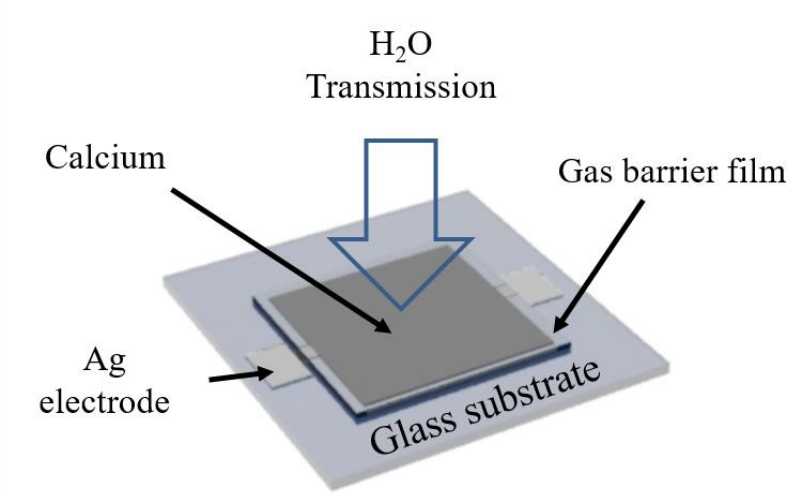

Figure. S1 Schematics for Ca-test system

WVTR values were analyzed using the Ca-test method, shown in Figure S1. A Ag electrode was deposited on a glass substrate and Ca was deposited on this to a height of 100 nm. The flexible gas-barrier film on the deposited Ca was attached using UV-resin. A Keithley 237 multimeter was used to measure the *I–V* characteristics. The voltage applied to the Ag electrode was 5mV. In accordance with previous studies, the WVTR value of the gas-barrier film was measured using the property that the resistance of Ca changes due to the role of the insulator when Ca reacts with H_2O.

2. Change in transmittance of a Ca test cell

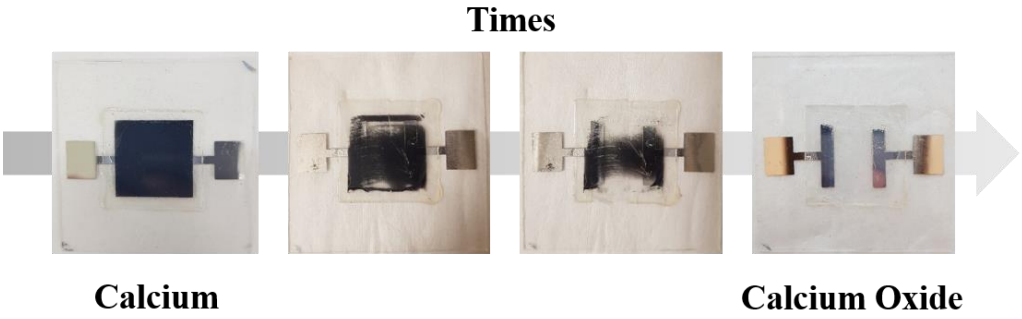

Figure. S2 Changes in Ca-test cell with time.

Ca is oxidized by water permeation through the gas-barrier film, according to the following chemical reactions:

$$Ca + H_2O \rightarrow CaO + H_2 \quad \text{(Equation S1)}$$

$$2Ca + O_2 \rightarrow 2CaO \quad \text{(Equation S2)}$$

$$CaO + H_2O \rightarrow Ca(OH)_2 \quad \text{(Equation S3)}$$

Figure. S2 shows that as Ca reacts with water permeating the gas-barrier film, the Ca is oxidized and its transmittance changes in accordance with time. Since CaO has a transparent characteristic, it was confirmed that Figure. S2 gradually became more transparent with time.