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Room-temperature ferromagnetic behavior in electride $12CaO{\cdot}7Al_2O_3$ NORORU WADA, SHO NAKAMURA, KOTARO TSUBAKI, Toyo University, TOYO UNIVERSITY COLLABORATION — Crystalline dodecacalcium hepta-aluminate $12CaO{\cdot}7Al_2O_3$ (C12A7) has a nanoporous structure that contains twelve cages with an inner diameter of 0.44 nm per unit cell. By replacing the O^{2-} ions originally incorporated in some cages with electrons, C12A7 becomes electride and is known to exhibit a variety of interesting physical and chemical properties. Here, we report results on SQUID magnetic measurements of electride C12A7, where ferromagnetic behavior that persisted even above room temperature was found. Electride samples were prepared by heating C12A7 samples in vacuum with metallic Ca at 700 and 800 °C for specific periods of time. Although as-is C12A7 samples showed paramagnetic behavior, once the as-is samples were reduced with metallic Ca, they exhibited magnetization curves which suggested ferromagnetism. It was found that the longer the reducing time was and the higher the reducing temperature was, the larger the saturation magnetization value became. Systematic magnetization behavior found as functions of reducing time and temperature might suggest the ferromagnetism found in electride C12A7 originated from the electron spins in the cages. The origin of ferromagnetism found in electride C12A7 will be discussed.

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