

Electronic Supplementary Information

Large scaled hexagonal prismatic sub-micro sized Mg crystals by a vapor-liquid-solid process

Junqing Hu,^{*a} Zhigang Chen,^a Na Wang,^a Yuelin Song,^a Hao Jiang,^b and Yangang Sun^a

^a *State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, College of Materials Science and Engineering, Donghua University, Shanghai 201620, China. E-mail: Hu.junqing@dhu.edu.cn (Junqing Hu), Tel/Fax: 86-21-6779-2947*

^b *Key Laboratory for Ultrafine Materials of Ministry of Education, School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, P. R. China*

Synthesis route:

The hexagonal prismatic Mg crystals were grown using a high-temperature vacuum tube furnace. In a typical procedure, MgB₂ powders were put on an alumina boat and then moved to the central region of the alumina tube. Several strip-like Si wafers ultrasonically cleaned in acetone were used as substrates and placed on a wide alumina plate, which was inserted downstream into the tube. The tube was then pumped down to a base pressure of 2×10^{-2} torr. A constant flow of Ar mixed with 10% H₂ was introduced into the tube at a flow rate of 120 sccm and a total pressure of ~ 400 torr during the fabrication process. The furnace was heated at a rate of 30 °C/min to 800 °C and maintained at this temperature for 1 hour, followed by further heating to and holding at 1400 °C for 3 h before it was finally cooled to room temperature. During the product deposition process, to measure the temperature at the deposition position, a thinner alumina tube was inserted inside the larger tube. One end of the thinner tube was closed and located at the center of the furnace, while the other end was open and extended outside the furnace. A movable thermocouple inserted inside the thinner tube was used to measure the temperature at any point between the tube center and the downstream tube end. The collected products from the Si wafers were characterized using X-ray powder diffraction (XRD; RINT

2200) with $\text{CuK}\alpha$ radiation, scanning electron microscopy (SEM; S-4800), and transmission electron microscope (JEM-2100F), equipped with an X-ray energy dispersive spectrometer (EDS).

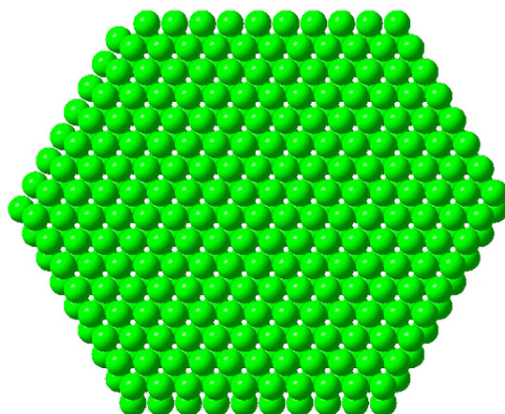


Fig. S1 A structural model of the *hcp* structured metallic Mg on the (001) plane.

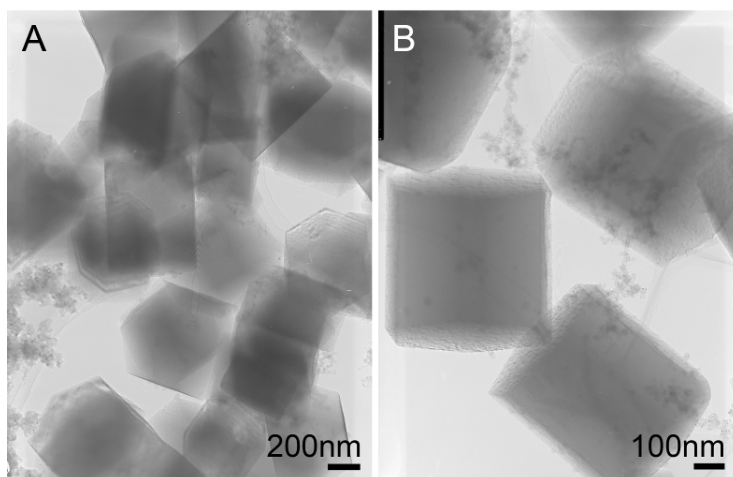


Fig. S2 TEM images show the Mg hexagonal prismatic crystals with a shorter height (A) and a longer height (B) grown at a low and a high temperature area, respectively.

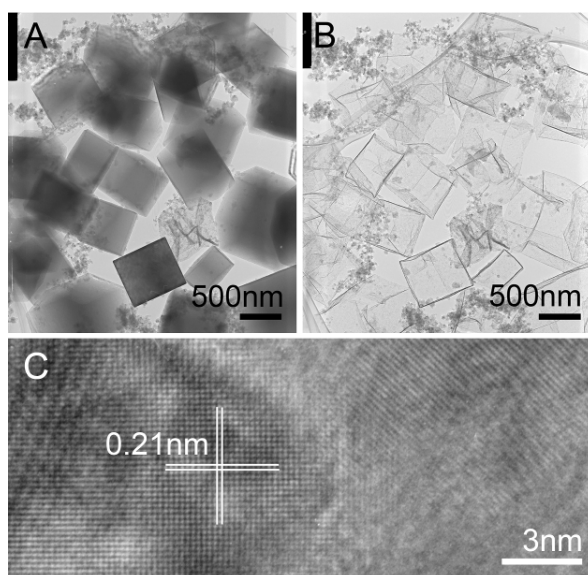


Fig. S3 (A) and (B) TEM images showing Mg solid hexagonal prismatic crystals (precursor) and corresponding MgO hollow hexagonal prismatic boxes (counterparts) after EB irradiation on the Mg crystals in TEM imaging. (C) HRTEM image taken from a MgO box' wall. A marked interplanar d-spacings (of ~ 0.21 nm) corresponding to the $\{200\}$ lattice fringes of the MgO crystal.