Production of porous 1T/2H multiphase MoS_2 nanosheets in a Taylor-Couette flow reactor for the application in the electrocatalytic hydrogen evolution reaction.

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Hydrogen has important value as a next-generation sustainable energy source to replace fossil fuels. MoS_2 has an electrocatalytic property suitable for the hydrogen evolution reaction (HER), and has been spotlighted as a substitute for noble metal catalyst such as Pt, a representative hydrogen generation catalyst. In this study, we propose the production of porous 1T/2H multiphase MoS_2 nanosheets (PM-MoS_2) to solve the problem of electron-hole separation, low hydrogen conversion rate, low electro conductivity and insufficient active site, which are known as problems in applying MoS_2 as an electrocatalyst for HER. PM-MoS_2 were prepared in a single step using Taylor-Couette flow reactor. The pore morphology of PM-MoS_2 was confirmed by transmission electron microscopy. Multiphase of PM-MoS_2 was confirmed by Raman spectroscopy and X-ray photoelectron spectroscopy. PM-MoS_2 shows 77.27mV in Tafel slope which is 70% higher efficiency compare to pristine MoS_2 (45.79mV)