Metallic 1T MoS₂ greatly benefits the application of MoS₂ in many fields, such as electrochemical energy storage systems, due to its considerably higher conductivity as compared to semiconducting 2H MoS₂. Alkali metals, such as Li, Na and K, are always used to prepare 1T MoS₂ through intercalation of alkali metal ions into the interlayer of 2H MoS₂. Nevertheless, the properties of MoS₂ with alkali-earth metals as guest in the interlayer are rarely investigated and the influences of these guest ions on the polymorphs of MoS₂ have not been known. Herein, we introduced hydrated Mg ions as the guest into MoS₂ nanosheets, which leads to enlarged interlayer spacing of 1.144 nm as compared to pristine MoS₂ and restacking MoS₂. Moreover, the 1T phase concentration after the introduction of hydrated Mg ions was as high as ~90%. Consequently, as supercapacitor electrode, the specific capacitance of the MoS₂ with Mg guest ions was greatly improved as compared to the restacking MoS₂ or pristine MoS₂ counterparts at different discharging/charging rates. Both the energy densities and power densities of the MoS₂ with Mg guest ions electrode were therefore superior to the other two electrodes.