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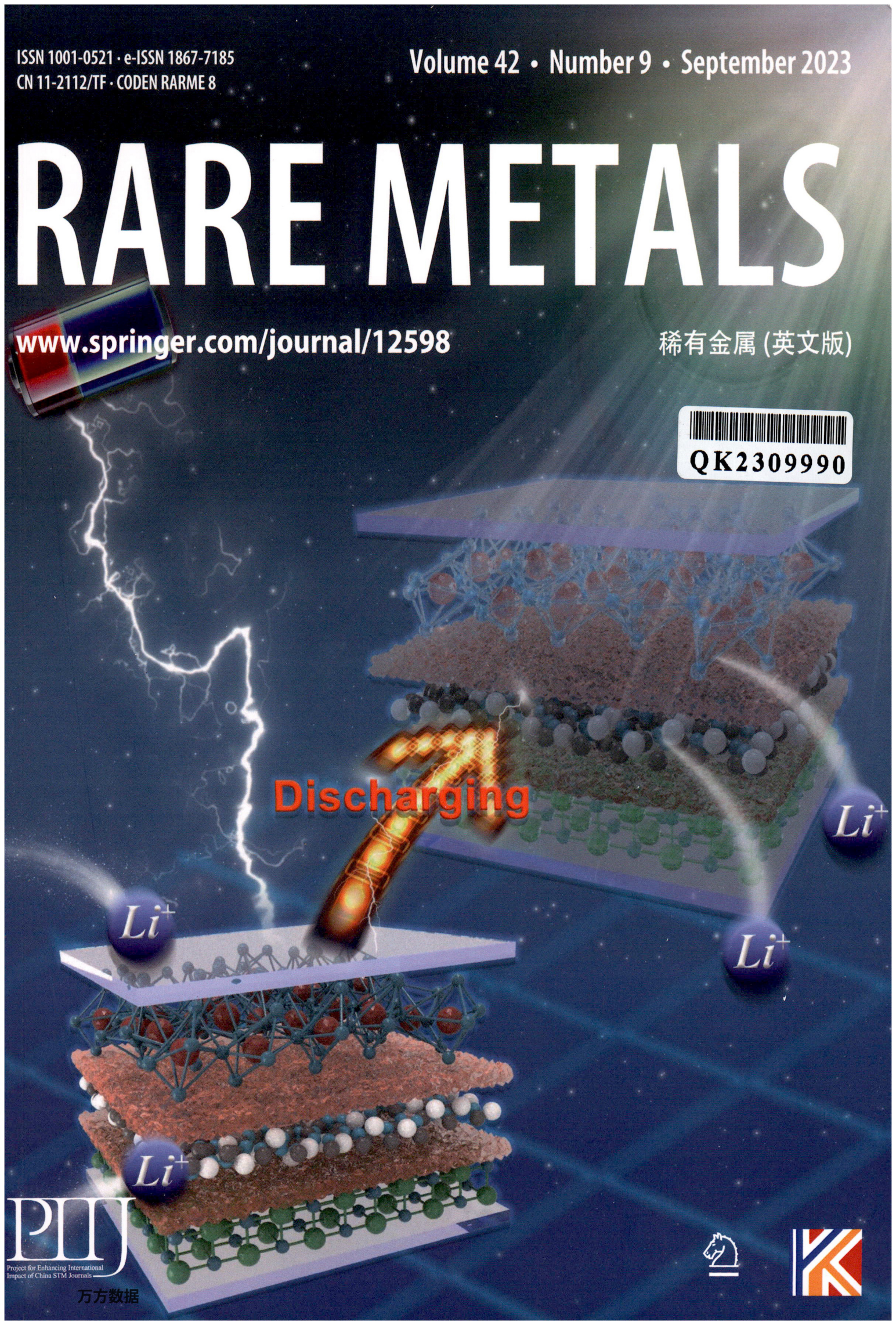

RARE METALS (Monthly)

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Cover Picture
L. Liu et al. Anti-self-discharge ultrathin all-inorganic electrochromic asymmetric supercapacitors enabling intelligent and effective energy storage.

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Cover story

Anti-self-discharge ultrathin all-inorganic electrochromic device able to visualize energy status and effective energy storage

(Lei Liu*, Chen Liu, Meng-Ying Wang, Bin Li, Ke Wang, Xiang-Qian Fan, Li-Yong Wang, Hui-Qi Wang, Sheng-Liang Hu, Xun-Gang Diao* pp. 2957–2971)

Recently, electrochromic energy storage devices (EESDs) have attracted tremendous attention because of their integrated energy storage and color-changing into one single entity, and are expected to be a technological breakthrough in solving the energy issues of storage and saving. In this work, we demonstrated an ultrathin all-inorganic EESD with excellent anti-self-discharge performance enabled by introducing a thin film (Ta_2O_5 layer) at the electrode/electrolyte interface. Through the above design, the developed all-inorganic EESD possessed a wide operating voltage of 2.2 V, a higher coloration efficiency of ~74.2 $cm^2 \cdot C^{-1}$, and a high power/energy density, along with superior electrochemical and electrochromic performance. Remarkably, the all-inorganic EESD possessed a tardy self-discharge rate of 12.6 $mV \cdot h^{-1}$, which was an extremely low value compared with previous work. Significantly, the ultrathin all-inorganic EESDs could also well maintain a slow self-discharge rate and their original electrochemical characteristics under various environmental temperatures. Considering that the research about self-discharge behavior of all-inorganic EESD is still in its infancy, this work may provide a deep insight into the self-discharge process and a promising strategy to design high-performance intelligent electronics.

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