ISSN 1001-0521 · e-ISSN 1867-7185
CN 11-2112/TF · CODEN RARME 8

Volume 42 • Number 7 • July 2023

RARE METALS

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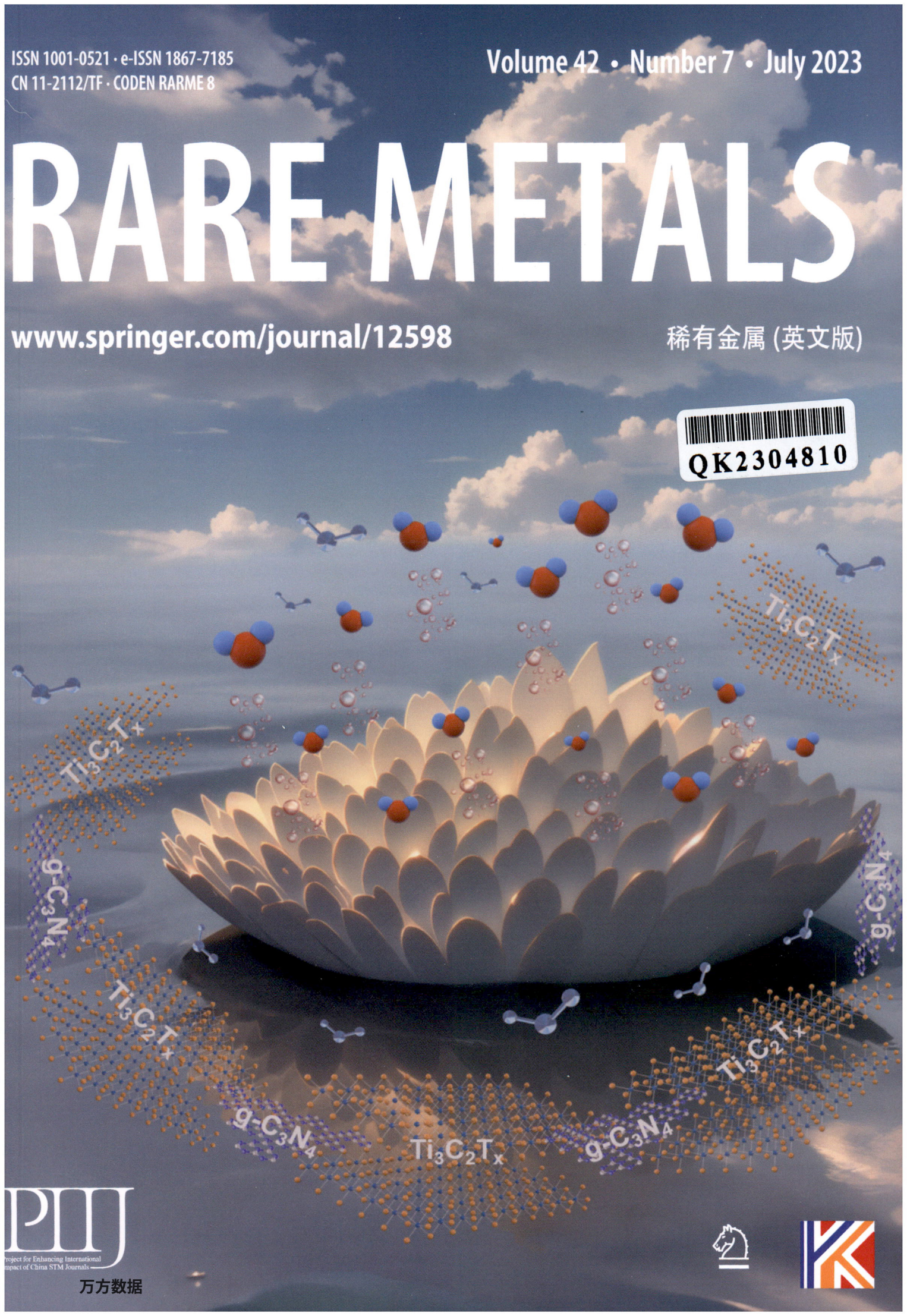

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Cover Picture
Y. Lu et al. Flexible impedance sensor based on $Ti_3C_2T_x$ MXene and graphitic carbon nitride nanohybrid for humidity-sensing application with ultrahigh response.

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Cover story

Flexible impedance sensor based on $Ti_3C_2T_x$ MXene and graphitic carbon nitride nanohybrid for humidity-sensing application with ultrahigh response

(Yang Lu, Meng-Yu Wang, Dong-Yue Wang, Yue-Hang Sun, Zi-Hao Liu, Rong-Ke Gao, Lian-Dong Yu*, Dong-Zhi Zhang* pp. 2204–2213)

Humidity monitoring and control have become more important in various fields, such as food storage, industrial production, textile technology, and agriculture. As an emerging 2D material, $Ti_3C_2T_x$ has attracted much interest due to its high electrical conductivity and surface composition. The abundant OH group on the surface gives $Ti_3C_2T_x$ excellent hydrophilicity, resulting in great potential of $Ti_3C_2T_x$ as humidity-sensitive material. As a well-known organic polymer with a two-dimensional layered structure, metal-free semiconductor graphitic carbon nitride (g-C_3N_4) has attractive electronic band structure and good chemical stability, making it have great potential in manufacturing humidity sensors. In this work, a novel sensor was prepared by $Ti_3C_2T_x$/g-C_3N_4 hybrid film with ultrahigh response in impedance when exposed to 11%–97% RH at a room temperature of 20°C. The application of multiple characterizations fully demonstrates the microstructure of $Ti_3C_2T_x$/g-C_3N_4 nanocomposites. The manufactured humidity sensor has excellent repeatability, fast response/recovery time, and almost negligible hysteresis. All of these prove its broad application in real-time human breath monitoring and water evaporation detection. Flexible humidity testing experiments based on PET substrates have also been used to verify the sensor's multiple applicability. The excellent sensing performance of $Ti_3C_2T_x$/g-C_3N_4 composite material proves its great potential in manufacturing high-performance humidity sensors.

Edited and Published by Youke Publishing Co., Ltd.
(No. 2, Xinjiekouwai Str., 100088 Beijing, China)
Tel.: +86 10 82241917; Fax:+86 10 82240869
Email: raremetals@grinm.com
Administrator: China Association for Science and Technology
Sponsor: The Nonferrous Metals Society of China
China GRINM Group Co., Ltd.
Printer: Beijing Shengpinfengshang Technology Development Co., Ltd., Beijing, China

ISSN 1001-0521

9 771001 052237 07

Price: RMB 500