



SCUT Newsletter

ADVANCED MATERIALS

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Ultrastrong and High Thermal Insulating Porous High-Entropy Ceramics up to 2000 °C

Zihao Wen, Zhongyu Tang, Yiyen Liu, Lei Zhuang, Hulei Yu, Yanhui Chu

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South China Univ of Tech Open URL

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Abstract

High mechanical load-carrying capacity and high thermal insulating performance are crucial to thermal-insulation materials under extreme conditions. However, these features are often difficult to achieve simultaneously. Herein, for the first time, it is reported a multiscale structure design and fast fabrication of 9-cation porous high-entropy diboride ceramics via an ultrafast high-temperature synthesis technique that can lead to exceptional mechanical load-bearing capability and high thermal insulation performance. With the construction of multiscale structures including ultrafine pores at the microscale, high-quality interfaces between building blocks at the nanoscale, and severe lattice distortion at the atomic scale, the materials with an ≈50% increase in thermal insulation performance are achieved. The materials exhibit a compressive strength of up to 227 MPa at 2000 °C.

Figures References Related Information

Recommended

Fabrication and properties of porous anorthite/mullite ceramics with both high porosity and high strength

Early View
Online Version of Record
before Inclusion in an issue
2311870

1. Resistant to 2,000 degrees Celsius! SCUT developed an ultra-high-strength, high-thermal-insulating high-entropy porous ceramic material

2000

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6RXWK &KLQD 8QLYHUVLW\ RI 7HFKQRORJ\ 6&87 VXFFHVVIXOO\ GH
FHUPLF PDWHULDO ZLWK XOWUD VWURQJ PHFKDQLFDO VWUHQJWK
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2. SCUT scholars made new progress in NanoTAC technology for precise cancer treatment

NanoTAC

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IURP WKH 6FKRRO RI 0HGLFLQH RI 6&87 7KHLU UHVHDUFK WLWO
SURWHLQ GHJUDGDWLRQ E\ PLPLFNLQJ VHOHFWLYH DXWRSKUDJ\
1DQRWHFKQRORJ\ SXEOLFDWLRQ LQWURGXFHV WKH 1DQR7\$& WH
PXOWLIXQFWLRQDO ELRPLPHWLF QDQR UHFHSWRUV 7KH VWXQ\ DOV
WKH SUHFLVH WUHDWPHQW RI FDQFHU XVLQJ 1DQR7\$& WHFKQRORJ\
VXSSUHVVRU PXWDQW S

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KXPDQ ERG\ V QDWXUDO GHJUDGDWLRQ V\ VWHP 7KH LQQRWDWLYH
WKH SHQGLQJ)'\$ DSSURYDO QDQRGUXJ FDUULHU 3(* 3/\$ 7KH
VHOIDVVHPEOLQJ ELRPLPHWLF QDQRUHFHSWRUV 15V WKDW PLPL
KDYH ERWK D FRPSRQHQRW IRU WDUJHWLQJ WKH GHVLUHG SURWH
FRPSRQHQRW IRU HQKDQFLQJ GHJUDGDWLRQ FDWLRQLF OLSLG 7KH
FDWLRQLF OLSLG VLPXOWDQHRXVO\ WDUJHWV DXWRSKDJRVRPHV
IRUPDWLRQ LQFUHDVLQJ PXWDQW S GHJUDGDWLRQ 7KH 15V DUH
GHULYHG [HQRJUDIW RYDULDQ FDQFHU PRGHO LQ YLYR 7KH ZRUN
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3. The first "National Engineer Award" was presented! SCUT received recognition

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JDLQHG WKH WLWOH 1DWLRQDO 2XWVWDQGLQJ (QJLQHUU 7HDP
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DQG WHFKQRORJLFDO VHOI UHOLDQFH DQG VHOI VWUHQJWKHQLOQ
GHYHORSPHQW

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4.SCUT Guangzhou International Campus's first phase project received the Tien-yow Jeme Civil Engineering Prize

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LQWHUQDWLRQDO FROODERUDWLRQ DQG LV WKH ILUVW GRXEOL IL
WKH QHZ ,QWHUQDWLRQDOL]DWLRQ DW +RPH ,D+ PRGHO ,W LV
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SKDVH SURMHFW ZKLFK KDV D WRWDO SODQQHG ODQG DUHD RI DEF
VT P SULPDULO\ FRQVLVWV RI VWDQGDORQH EXLOGHQJV V
FHQWHUV DQG GRUPLWRULHV DV ZHOO DV VXSSRUWLQJ PXQLFLSD
XQGHU WKH (3& PRGH ZLWK D WRWDO LQYHVWPHQW RI ELOOL
&RQVWUXFWLRQ WRRN SODFH IURP \$XJXVW WR WKH KDQG
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 E\ WKH 0LQLVWU\ RI +RXVLQJ DQG 8UEDQ 5XUDO 'HYHORSPHQW DQ
 DQG 7HFKQRORJ\ LV RUJDQL]HG E\ WKH &KLQD &LYLO (QJLQHHUL
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Observation of single-molecule Raman spectroscopy enabled by synergic electromagnetic and chemical enhancement

Haiyao Yang, Haoran Mo, Jianzhi Zhang, Lihong Hong & Zhi-Yuan Li

Photonix 5, Article number: 3 (2024) | [Cite this article](#)

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Abstract

There has been a long fundamental pursuit to enhance and levitate the Raman scattering signal intensity of molecule by a huge number of ~14–15 orders of magnitude, to the level comparable with the molecule fluorescence intensity and truly entering the regime of single-

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Sections Figures

[Abstract](#)
[Introduction](#)
[Results](#)
[Discussion](#)
[Method](#)
[Availability of data and materials](#)
[References](#)

5.Single-molecule Raman spectroscopy realized – SCUT team put forward a new strategy for synergic electromagnetic and chemical enhancement

2Q)HEUXDU\ WKH WHDP OHG E\ 3URIHVVRU /L =KL\XDQ 6FKRRO
 SXEOLVKHG WKH UHVHDUFK ILQGLQJV HQWLWOHG 2EVHUYDWLRQ RI
 E\ 6\QHUJLF (OHFWURPDJQHWLF DQG &KHPLFDO (QKDQFHPHQW LQ
 WKH ILHOG RI RSWLFV 7KL VHVXOW UHDOL]HV VLQJOH PROHFHOR
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GLR[LGH OD\HU IURP ERWWRP WR WRS WR EXLOG D VLP SOH SODV
LQVHUWHG VLQJOH OD\HU WXQJVWHQ GLVXOILGH DEVRUELQJ 5KRGD
DQG PDWFKLQJ PROHFXOHV WR EH WHVWHG LQ RUGHU WR IRUP D 5
HOHFWURPDJQHWLF DQG FKHPLFDO HQKDQFHPHQW PHFKDQLVP (Y
PROHFXOHV LQ WKLV HQKDQFHG VXEVDUDWH LV DV ORZ DV H F
DQG WKH 5DPDQ VLJQDO RI D VLQJOH PROHFXOH FDQ EH GHWHFWHG
VXEVDUDWH KDV D VLP SOH VWUXFWXUH DQG WKH YDULRXV SDUWV
KLJKO\ VFDODEOH ,W RIIHUV EURDG SURVSHFWV IRU IXUWKHU UHVH

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6.SCUT students won women's doubles championship at 2024 German Open Badminton

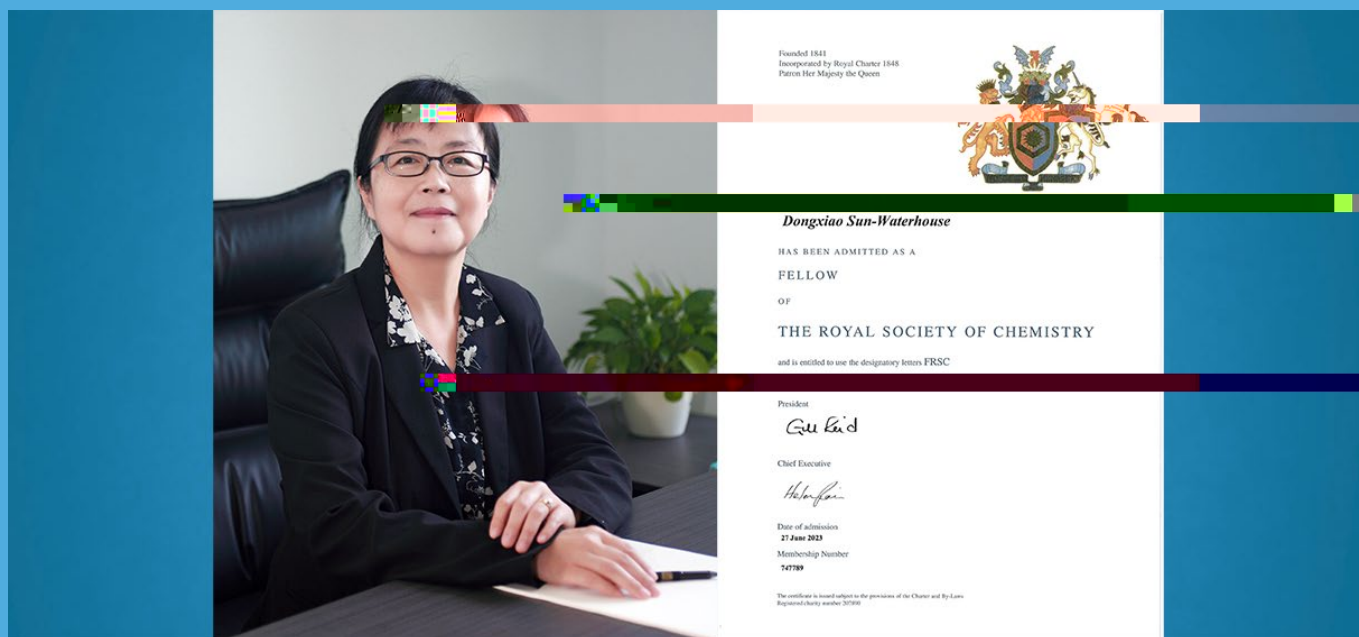
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7.Professor Sun Dongxiao, SCUT School of Food Science and Engineering elected as IAFoST
Fellow

Fellow

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,QWHUQDWLRQDO \$FDGHP\ RI)RRG 6FLHQFH DQG 7HFKQRORJ\ ,)\$
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RUJDQL]DWLRQ HVWDEOLVKHG E\ ,)\$R67 ,W LV FRPSRVHG RI RXV
WHFKQRORJ\ 7KH ,)\$R67)HOORZV EL DQQXDO VHOHVFLWRQV IURP
FRQWULEXWHG H[FHSWLRQDOO\ WR JOREDO IRRG VFLHQFH DQG W
HOHFWHG HDEFK WLPH ,W LV WKH KLJKHVW DFFRODGH IRU H[SHUWV

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Report View by Section

Total: 16	Research Fields	Web of Science Documents	Cites	Cites/Paper	Top Papers
7	BIOCHEMISTRY	1,913	43,913	23.00	18
8	ENVIRONMENT/ECOLOGY	2,015	45,469	22.57	36
9	CLINICAL MEDICINE	2,139	27,097	12.67	22
10	MOLECULAR BIOLOGY & GENETICS	606	14,378	23.73	6
11	GEOSCIENCES	457	8,352	18.28	10
12	MATHEMATICS	1,144	7,556	6.60	21
13	PHARMACOLOGY & TOXICOLOGY	550	7,288	13.25	6
14	SOCIAL SCIENCES, GENERAL	526	6,362	12.10	13
15	PLANT & ANIMAL SCIENCE	278	3,509	12.62	1
0	ALL FIELDS	57,680	1,287,595	22.32	1,106

8. Breakthroughs made in the construction of SCUT science and engineering disciplines

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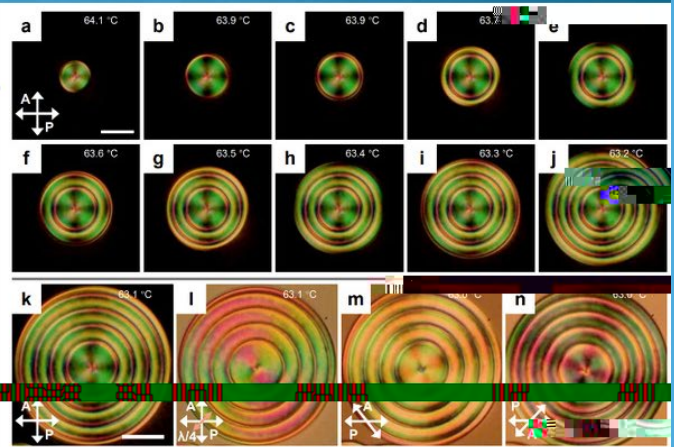
Flexoelectricity-driven toroidal polar topology in liquid-matter helielectricsJidan Yang, Yu Zou, Jinxing Li, Mingjun Huang  & Satoshi Aya 

Nature Physics (2024) | Cite this article

519 Accesses | 2 Altmetric | Metrics

Abstract

Magnetic and electric dipoles have similar symmetry and are therefore expected to exhibit many common structures. However, despite frequent reports of various spin textures



9. SCUT team discovered and resolved novel electrically polarized topological structure in liquid ferroelectric nematics

7KH UHVHDFK WHDP OHG E\ 6DWRVKL \$\D DQG 0LQJMXQ +XDQJ IUR
6&87 KDV PDGH D PDMRU EUHDNWKURXJK LQ IHUURHOHFWULF QHPD
1DWXUH 3K\VLFFV ZLWK WKH WLWOH RI)OH[RHOHFWULFLW\ GULY
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RI WKH HOHFWULFDOO\ SRODUL]HG VWUXFWXUH LQ OLTXLG IHUUR
OLPLWDWLRQV RI WKH HOHFWULF SRODUL]DWLRQ VWUXFWXUH LQ V
GHHSHQLQJ WKH XQGHUVWDQGLQJ RI WRSRORJLFDO VWUXFWXUH IR
LW DOVR SURYLGHV WKHRUHWLFDO JXLGDQFH DQG H[SHULPHQWD
RSWRHOHFWURQLF GHYLFHV ,Q SDUWLFXODU WKH XQLTXH GV
FKDUDFWHULVWLFV RI WKH SRODUL]HG WRURLGDO GRPDLQ UHJLRQ
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10. Promoting the application of hyperspectral imaging technology in the food industry –
Academician Sun Dawen published a paper in *Nature*

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