

# Table of contents

<b>Foreword</b> .....	<b>2</b>
<b>Table of contents</b> .....	<b>4</b>
<b>Fraunhofer IKTS in profile</b> .....	<b>6</b>
Portrait .....	6
Organizational chart .....	8
Fraunhofer IKTS in figures .....	10
Board of trustees .....	12
The Fraunhofer-Gesellschaft .....	13
Retrospective .....	14
<b>Highlights from our business divisions</b> .....	<b>20</b>
<b>In interview</b> .....	<b>22</b>
Carbon in the cycle .....	22
Cultivating plants in a controlled environment .....	26
<b>Materials and Processes</b> .....	<b>28</b>
Porous ceramics for optical moisture sensors .....	28
Durable ceramic heat exchanger honeycombs for exhaust air purification .....	29
Superlubrication for ceramic bearings on silicon nitride-silicon carbide basis .....	30
Cobalt-free hardmetal-diamond composites .....	31
Selective laser sintering for the production of complex SiSiC ceramics .....	32
Efficient multi-wire sawing process for high-performance oxide ceramic substrates .....	33
<b>Energy</b> .....	<b>34</b>
Study on decentralized energy supply for agriculture and rural areas .....	34
Ammonia for efficient, CO <sub>2</sub> -free power generation .....	35
Dynamics of alkaline water electrolysis .....	36
Solid electrolyte substrates for sodium batteries .....	37
Composite electrodes and layered oxides: utilizing the potential of sodium batteries .....	38
Securing critical raw materials for e-mobility. The METALLICO project .....	39
Multimodal analysis and automated evaluation of cathode quality .....	40
<b>Water</b> .....	<b>41</b>
Removing PFAS with ceramic adsorbers and ultrasound .....	41
Efficient production of modular silicon carbide membrane stacks .....	42
Potentials of energy- and nutrient-rich process water for a circular economy .....	43
Underground testing facility for arsenic and fluoride removal from mine water .....	44

<b>■ Environmental and Process Engineering</b> .....	<b>45</b>
Recycling of polycarbonates through pyrolysis .....	45
AI-based flame diagnostics for partial oxidation processes .....	46
Degradation behavior of iron-based Fischer-Tropsch catalysts .....	47
Water-saving production of soda using electrochemical membrane processes .....	48
Spin-off POXOS® launches membrane systems for oxygen to market .....	49
AI-controlled biogas production .....	50
Standardized evaluation of the effect of nutrient recyclates on plant growth .....	51
<b>■ Electronics and Microsystems</b> .....	<b>52</b>
Sustainable electronics: evaluation of the degradation of mold material for power electronics .....	52
Geometrically highly complex ceramic sensor systems (sensor triad) .....	53
ProPlug – integrated interfaces for functionalized lightweight structures .....	54
<b>■ Non-Destructive Testing and Monitoring</b> .....	<b>55</b>
Reject-free forming with optical inline monitoring .....	55
Integrated monitoring for durable lightweight vehicle modules .....	56
<b>■ Mechanical and Automotive Engineering</b> .....	<b>57</b>
Diamond-SiC composites for highly exposed bearings and seals .....	57
Ceramic Tesla valve .....	58
Cost-effective production of silicon nitride components with injection molding .....	59
CFRP containment shells in energy-efficient high-power pumps .....	60
<b>■ Bio- and Medical Technology</b> .....	<b>61</b>
Novel biogenic building and construction materials for CO <sub>2</sub> fixation .....	61
AI-generated patient-specific finger joint implant .....	62
AGEUM – analytical laboratory evaluates health risks of environmental pollution .....	63
<b>■ Materials and Process Analysis</b> .....	<b>64</b>
Systematic failure analysis of ceramic components .....	64
Fracture toughness of 3Y-TZP ceramics – measured with the CNB method .....	65
Simulating the thermal properties of diamond-SiC composites .....	66
High-resolution characterization of coated battery powders .....	67
<b>■ Cooperation and memberships</b> .....	<b>68</b>
<b>Names, dates, events</b> .....	<b>75</b>
<b>Events and trade fairs in 2024</b> .....	<b>76</b>
<b>How to reach us</b> .....	<b>78</b>
<b>Contact</b> .....	<b>81</b>