



**BIOLOX<sup>®</sup> delta**  
Ceramics in Orthopaedics

**BIOLOX<sup>®</sup>**  
MATERIAL  
MATTERS<sup>®</sup>

## **BIOLOX<sup>®</sup> delta** 陶瓷概览

- 优异的生物学表现 <sup>1-5</sup>
- 免疫反应低 <sup>5, 6</sup>
- 高耐磨性 <sup>7-9</sup>
- 减少细菌黏附 <sup>10, 11</sup>
- 在金属离子释放方面  
具有安全性 <sup>12, 13</sup>
- 耐刮擦性 <sup>14-16</sup>
- 高浸润性 <sup>11, 17, 18</sup>
- 化学稳定性 <sup>12, 13</sup>



# BIOLOX<sup>®</sup> delta

## Ceramics in Orthopaedics

BIOLOX<sup>®</sup>  
MATERIAL  
MATTERS<sup>®</sup>

### 参考文献

1. Faye PA, Roualdes O, Rossignol F, Hartmann DJ, Desmoulière A. Engulfment of ceramic particles by fibroblasts does not alter cell behavior. *Biomed Mater.* 2017;12(1):015023. doi: 10.1088/1748-605X/aa5aa2.
2. Cunningham BW, Hallab NJ, Hu N, McAfee PC. Epidural application of spinal instrumentation particulate wear debris: a comprehensive evaluation of neurotoxicity using an in vivo animal model. *J. Neurosurg. Spine.* 2013;19(3):336-350. doi:10.3171/2013.5.SPINE13166.
3. Savarino L, Baldini N, Ciapetti G, Pellacani A, Giunti A. Is wear debris responsible for failure in alumina-on-alumina implants? *Acta Orthop.* 2009;80(2):162-167. doi:10.3109/17453670902876730.
4. Asif IM, Williams S, Fisher J, Al-Hajjar M, Anderson J, Tipper JL. Characterisation and biocompatibility of composite ceramic particles used to manufacture ceramic-on-ceramic total hip replacements. *Front. Bioeng. Biotechnol. Conference Abstract: 10th World Biomaterials Congress.* doi:10.3389/conf.FBIOE.2016.01.00793.
5. Asif I M. *Characterisation and biological impact of wear particles from composite ceramic hip replacements.* [PhD thesis]. Leeds, UK: University of Leeds; 2018. <http://etheses.whiterose.ac.uk/20563/>.
6. Krenn V, Thomas P, Thomsen M, et al. Histopathological Particle Identification (The Krenn Particle Algorithm). *CeraNews* 2013;2:12-17.
7. Grupp TM, Holderied M, Mulliez MA, et al. Biotribology of a vitamin E-stabilized polyethylene for hip arthroplasty – Influence of artificial ageing and third-body particles on wear. *Acta Biomater.* 2014;10:3068-3078. doi:10.1016/j.actbio.2014.02.052.
8. van Loon J, Hoorneborg D, van der Vis HM, et al. Ceramic-on-ceramic vs ceramic-on-polyethylene, a comparative study with 10-year follow-up. *World J Orthop.* 2021;12(1):14-23. doi: 10.5312/wjov.v12.i1.14.
9. Feng B, Ren Y, Cao S, et al. Comparison of ceramic-on-ceramic bearing vs ceramic-on-highly cross-linked polyethylene-bearing surfaces in total hip arthroplasty for avascular necrosis of femoral head: a prospective cohort study with a mid-term follow-up. *Journal of orthopaedic surgery and research.* 2019;14(1):388-394. doi:10.1186/s13018-019-1410-8.
10. Trampuz A, Maiolo EM, Winkler T, Perka C. Biofilm formation on ceramic, metal and polyethylene bearing components from hip joint replacement systems. *Orthopaedic Proceedings.* 2016;98-B(SUPP 10):80-80. doi:10.1302/1358-992X.98BSUPP\_10.ISTA2015-080.
11. Sorrentino R, Cochis A, Azzimonti B, et al. Reduced bacterial adhesion on ceramics used for arthroplasty applications. *J Eur Ceram Soc.* 2018;38(3):963-970. doi:10.1016/j.jeurceramsoc.2017.10.008.
12. Thomas P, Stea S. *Metal implant allergy and immuno-allergological compatibility aspects of ceramic materials.* Heidelberg, Germany: Springer-Verlag Berlin Heidelberg; 2015.
13. Kretzer JP, Mueller U, Streit MR, et al. Ion release in ceramic bearings for total hip replacement: Results from an in vitro and an in vivo study. *Int Orthop.* 2018;42(1):65-70. doi:10.1007/s00264-017-3568-1.
14. Piconi C, Porporati AA, Streicher RM. Ceramics in THR bearings: behavior under off-normal conditions. *Key Eng Mat.* 2014;631:3-7. doi:10.4028/www.scientific.net/KEM.631.3.
15. Lee R, Essner A, Wang A, Jaffe WL. Scratch and wear performance of prosthetic femoral head components against crosslinked UHMWPE sockets. *Wear.* 2009;267(11):1915-1921. doi:10.1016/j.wear.2009.03.034.
16. De Fine M, Terrando S, Hintner M, Porporati AA, Pignatti G. Pushing Ceramic-on-Ceramic in the most extreme wear conditions: A hip simulator study. *Orthop Traumatol Surg Res.* 2020;S1877-0568(20)30184-5. doi:10.1016/j.otsr.2020.05.003.
17. Caravaca C, Porporati AA, Streicher R. Wettability of bearing couples: how to prepare the surfaces. *Bone & Joint Journal Orthopaedic Proceedings.* 2016;98-B(SUPP 7):67.
18. Affatato S, Ruggiero A. Biotribology in arthroplasty: worn surfaces investigation on ceramic hip femoral heads considering wettability. *Applied Sciences.* 2020;10(24):8919. doi:10.3390/app10248919.

声明：CeramTec 有限责任公司并非适用法律意义上的 BIOLOX<sup>®</sup> 陶瓷产品的注册者或法定医疗器械制造商，其产品尚未可直接用于病患。所有相关的医疗器械由 CeramTec 有限责任公司的客户在相关国家 / 地区进行注册。请检查您所在国家 / 地区的监管批准。本信息仅用于学术交流目的。关于产品及相关安全与风险信息，请参考法定医疗器械制造商的标签及产品说明书。

CeramTec GmbH | Medical Products Division  
CeramTec-Platz 1-9  
D-73207 Plochingen, Germany  
在华联系方式: (010) 8381 2856  
[www.bioloX.cn](http://www.bioloX.cn)

BIOLOX<sup>®</sup> 是德国 CeramTec 集团的注册商标。  
产品图片：CeramTec GmbH, 2020.

MT-00703-2208-CN-01



**CeramTec**  
THE CERAMIC EXPERTS