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MATHYS 
European Orthopaedics



Preservation in motion

For healthcare professional use only. The illustrated image does not represent a connection between the use of the medical device described, nor its performance.

Mathys ceramics

Experience and competence in bioceramics

Experience and competence

Since the early 1970s, we at Mathys have been active in the research, development and manufacture of bioceramics because we are convinced of their advantages: low abrasion rates, high strength and toughness, low risk of surface roughening, good wettability and biologically inert behaviour, making ceramics a treatment solution not only for young and active patients.

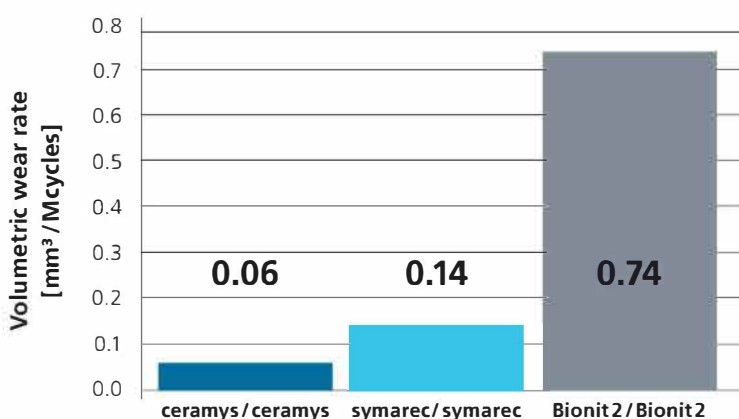
ceramys

The dispersion ceramic – ceramys – is made of a homogeneous dispersion of 20 % alumina and 80 % yttriumoxide stabilized zirconia and contains no other additives. ceramys has high resistance to fracture and good wear properties compared to alumina/ alumina and metal /polyethylene pairings. ^{1, 2, 3, 4} The portfolio comprises femoral heads, revision heads and inlays.

ceramys can be combined with the Mathys polyethylenes and all Mathys ceramics.



Wear rates in hip simulator test with microseparation ⁴



Advantages of ceramys and symarec

- High fracture resistance ¹
- Reduced risk of chipping and surface roughening in case of recurrent luxations ⁵
- Low wear rates under microseparation conditions ⁴
- Ageing resistant ⁶

*Building on our heritage
Moving technology forward
Step by step with our clinical partners
Towards a goal of preserving mobility*
Preservation in motion

As a Swiss company, Mathys is committed to this guiding principle and pursues a product portfolio with the goal of further developing traditional philosophies with respect to materials or design in order to address existing clinical challenges. This is reflected in our imagery: traditional Swiss activities in conjunction with continuously evolving sporting equipment.

Developed and produced from Mathys

Continuous research and development lead to an ongoing improvement of our existing materials. This is the key to the production of a new ceramics generation: ceramys and symarec.

symarec

The dispersion ceramic – symarec – is made of a homogeneous dispersion of 75 % alumina and 25 % yttriumoxide stabilized zirconia and contains no other additives. Ceramics with similar composition are already on the market since 2002. symarec has high resistance to fracture and good wear properties compared to alumina/alumina and metal/polyethylene pairings.^{1,2,4} The portfolio comprises femoral heads.



symarec can be combined with the Mathys polyethylenes and all Mathys ceramics.

Mathys ceramics – Material characteristics

Material characteristics	ceramys	symarec	Bionit2
Al ₂ O ₃ [wt %]	20	75	100
ZrO ₂ [wt %] yttria stabilized	80	25	0
Theor. density [g/cm ³]	5.51	4.37	3.99
Average grain size [µm]	0.4	0.8	2.3
Biaxial bending strength [MPa]	≥900	≥700	≥350
Fracture toughness (SEVNB) [MPa√m]	≥7	≥5	≥3

Resistant ceramic materials

Beside all advantages of a ceramic articulation, there is still one concern with ceramic materials: Ceramics are brittle and therefore have a residual risk of fracture. ceramys and symarec reduce this risk, due to the combination of zirconia and alumina. With the correct ceramic handling, ceramys and symarec provide safety against fracture for surgeons and patients.

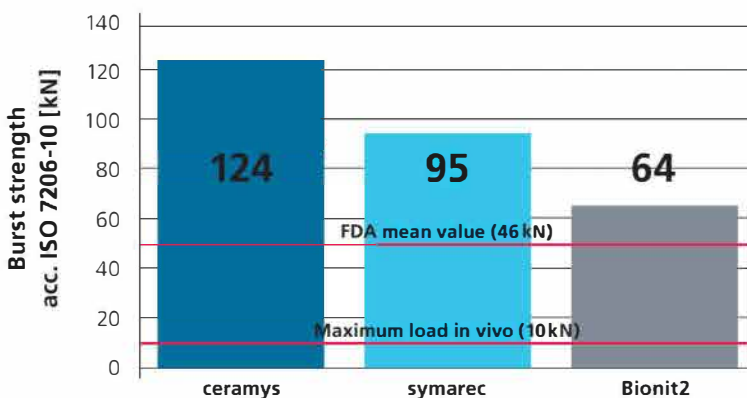
Bionit2

Bionit2 is an experienced, competent and reliable alumina ceramics for joint replacements. The portfolio comprises femoral heads.

Bionit2 can be combined with the Mathys polyethylenes and all Mathys ceramics.



Burst strength of Mathys ceramic hip heads (28 L) on titan taper¹



Advantages of Bionit2

- Low risk of particle induced osteolysis and loosening thanks to its hardness and wear properties in hard/soft pairings²
- No allergenic reaction, due to high purity and corrosion resistance⁷
- Good lubrication due to improved wettability, surface quality and sphericity⁸

References

- ¹ Data on file at Mathys Ltd Bettlach
- ² Data on file at Mathys Ltd Bettlach
- ³ Halma JJ. et al.: «Edge loading does not increase wear rates of ceramic-on-ceramic and metal-on-polyethylene articulations»; *J Biomed Mater Res Part B*, 102(8), pp 1627–38, 2014.
- ⁴ Al-Hajjar M., Jennings LM., Begand S., Oberbach T., Delfosse D., Fischer J.: «Wear of novel ceramic-on-ceramic bearings under adverse and clinically relevant hip simulator conditions»; *J. Biomed. Mater Res B: Applied Biomater*, 101(8), pp 1456–1462, 2013.
- ⁵ Oberbach T., Begand S., Glien W., Kadick C.: «Luxation test of different ceramic on ceramic couplings»; *Key Engineering Materials Vols. 330–332*, pp 1235–1238, 2007.
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- ⁷ Thomas P.: «Allergien durch Implantatwerkstoffe»; *Orthopäde*, Vol. 32, pp 60–64, 2003.
- ⁸ Willmann G.: «Improving Bearing Surfaces of Artificial Joints»; *Advanced Engineering Materials*, 2, No. 3, pp 135–141, 2001.
- ⁹ Ganzer D., Forke L., Irlenbusch U.: «Two-year follow-up of revision total hip arthroplasty using a ceramic revision head with a retained well-fixed femoral component: a case series»; *Journal of Medical Case Reports*, 8(1), pp 434, 2014.

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