

OsseoSpeed®

– für eine stärkere und schnellere Osseointegration

Was ist OsseoSpeed?

OsseoSpeed ist eine mäßig raue Implantatoberfläche, die aus einer gestrahlten Titanoberfläche (TiOblast) mit einer zusätzlichen chemischen Behandlung gewonnen wird. Die Oberflächeneigenschaften zeigen die Anlagerung von kleinen Mengen an Fluoridionen auf der Titanoxidschicht¹⁻⁷, eine definierte Oberflächenrauigkeit im Mikrometerbereich und eine einzigartige Nanotopografie^{1, 2, 4, 8-12}. Die chemischen und physikalischen Eigenschaften der OsseoSpeed-Oberfläche wurden eingehend untersucht und in der wissenschaftlichen Literatur beschrieben^{1, 3, 8, 10, 11, 13-21}. Die OsseoSpeed-Oberfläche wurde 2004 für die Implantate des Astra Tech Implant Systems eingeführt*.

Umfangreiche wissenschaftliche Erkenntnisse

Zahlreiche Veröffentlichungen berichteten von einer ähnlichen²²⁻²⁵ oder erhöhten Knochenbildung sowie einen stärkeren Knochen-Implantat-Kontakt an der OsseoSpeed-Oberfläche im Vergleich zu den Vorgängermodellen²⁶⁻³³ (TiOblast und maschinerte Titanoberflächen), und das bei einer schnelleren Heilung³⁴⁻³⁶. Die Ergebnisse wurden auch durch humanhistologische Analysen³⁷⁻⁴⁰ und in klinischen Studien^{41, 42} bestätigt.

Die Leistungsfähigkeit der OsseoSpeed-Oberfläche ist in verschiedenen experimentellen Modellen mit unterschiedlichen Schwerpunkten dokumentiert: *In vivo* Modelle^{6, 43-73} und *In vitro* Modelle^{15, 20, 74-85}. Während der frühen Einheilung berichten klinische Studien** über unveränderte Werte des Implantatstabilitätsquotienten (ISQ) und kürzere Einheilzeiten für OsseoSpeed Implantate^{41, 42, 86-88}. In Langzeit-Follow-ups zeigen die Daten zu OsseoSpeed-Implantaten stabile oder steigende ISQ-Werte⁸⁹⁻⁹¹ sowie gut erhaltenen marginalen Knochen⁹² - im Vergleich mit anderen Implantat-Oberflächen übertrifft OsseoSpeed diese in Bezug auf den Erhalt des marginalen Knochens⁹².

Verbesserte Osseointegration

Auch Faktoren wie eine erweiterte osteoblastische Differenzierung^{2, 7, 26, 75, 93, 94}, Biokompatibilität^{15, 95-97} sowie die thrombogenen Eigenschaften⁸ der OsseoSpeed-Oberfläche tragen zu einer besseren und beschleunigten Osseointegration bei^{26-36, 41, 42, 86-88}.

* Die OsseoSpeed-Oberfläche wurde 2021 bei DS PrimeTaper Implantaten eingeführt.

** Weitere Informationen zum OsseoSpeed Astra Tech Implant System in der klinischen Verwendung finden Sie im [Abstract](#).

Referenzen

- Ehrenfest, DM, Vazquez, L, Park, YJ, et al., Identification card and codification of the chemical and morphological characteristics of 14 dental implant surfaces. *J Oral Implantol* 2011;37(5):525-42. [Abstract](#)
- Guo, J, Padilla, RJ, Ambrose, W, et al., The effect of hydrofluoric acid treatment of TiO2 grit blasted titanium implants on adherent osteoblast gene expression in vitro and in vivo. *Biomaterials* 2007;28(36):5418-25. [Abstract](#)
- Hong, YS, Kim, MJ, Han, JS, et al., Effects of hydrophilicity and fluoride surface modifications to titanium dental implants on early osseointegration: an in vivo study. *Implant Dent* 2014;23(5):529-33. [Abstract](#)
- Johansson, CB, Gretzer, C, Jimbo, R, et al., Enhanced implant integration with hierarchically structured implants: a pilot study in rabbits. *Clin Oral Implants Res* 2012;23(8):943-53. [Abstract](#)
- Kang, BS, Sul, YH, Oh, SJ, et al., XPS, AES and SEM analysis of recent dental implants. *Acta Biomater* 2009;5(6):2222-9. [Abstract](#)
- Kang, IH, Kim, CW, Lim, YJ, et al., A comparative study on the initial stability of different implants placed above the bone level using resonance frequency analysis. *J Adv Prosthodont* 2011;3(4):190-5. [Abstract](#)
- Valencia, S, Gretzer, C, Cooper, LF, Surface nanofeature effects on titanium-adherent human mesenchymal stem cells. *Int J Oral Maxillofac Implants* 2009;24(1):38-46. [Abstract](#)
- Thor, A, Rasmusson, L, Wennerberg, A, et al., The role of whole blood in thrombin generation in contact with various titanium surfaces. *Biomaterials* 2007;28(6):966-74. [Abstract](#)
- Jarmar, T, Palmquist, A, Branemark, R, et al., Characterization of the surface properties of commercially available dental implants using scanning electron microscopy, focused ion beam, and high-resolution transmission electron microscopy. *Clin Implant Dent Relat Res* 2008;10(1):11-22. [Abstract](#)
- Svanborg, LM, Andersson, M, Wennerberg, A, Surface characterization of commercial oral implants on the nanometer level. *J Biomed Mater Res B* 2010;92(2):462-9. [Abstract](#)
- Mattisson, I, Gretzer, C, Ahlberg, E, Surface characterization, electrochemical properties and in vitro testing of hierarchically structured titanium surfaces. *Mater Res Bulletin* 2013;48(2):389-98. [Abstract](#)
- Petersson, IU, Löberg, JE, Fredriksson, AS, et al., Semi-conducting properties of titanium dioxide surfaces on titanium implants. *Biomaterials* 2009;30(27):4471-79. [Abstract](#)
- Duddeck, DU, Neugebauer, J, Scheer, M, et al., Surprises in the land of microns. *EDI* 2010;6(2):50-54.
- Fandridis, J, Papadopoulos, T, Surface characterization of three titanium dental implants. *Implant Dent* 2008;17(1):91-9. [Abstract](#)
- Liu, R, Lei, T, Dusevich, V, et al., Surface characteristics and cell adhesion: a comparative study of four commercial dental implants. *J Prosthodont* 2013;22(8):641-51. [Abstract](#)
- Rupp, F, Scheideler, L, Eichler, M, et al., Wetting behavior of dental implants. *Int J Oral Maxillofac Implants* 2011;26(6):1256-66. [Abstract](#)
- Senna, P, Antoninha Del Bel Curry, A, Kates, S, et al., Surface damage on dental implants with release of loose particles after insertion into bone. *Clin Implant Dent Relat Res* 2015;17(4):681-92. [Abstract](#)
- Shin, SI, Lee, EK, Kim, JH, et al., The effect of Er:YAG laser irradiation on hydroxyapatite-coated implants and fluoride-modified TiO2-blasted implant surfaces: a microstructural analysis. *Lasers Med Sci* 2013;28(3):823-31. [Abstract](#)
- Gaintantzopoulou, M, Zinelis, S, Silikas, N, et al., Micro-Raman spectroscopic analysis of TiO2 phases on the root surfaces of commercial dental implants. *Dent Mater* 2014;30(8):861-7. [Abstract](#)
- Kolafova, M, Stovicek, J, Strnad, J, et al., In vitro bioactivity test of real dental implants according to ISO 23317. *Int J Oral Maxillofac Implants* 2017;32(6):1221-30. [Abstract](#)
- Abaricia, JO, Shah, AH, Ruzga, MN, et al., Surface characteristics on commercial dental implants differentially activate macrophages in vitro and in vivo. *Clin Oral Implants Res* 2021;32(4):487-97. [Abstract](#)
- Choi, JY, Lee, HJ, Jang, JU, et al., Comparison between bioactive fluoride modified and bioinert anodically oxidized implant surfaces in early bone response using rabbit tibia model. *Implant Dent* 2012;21(2). [Abstract](#)
- Dasmah, A, Rasmusson, C, Thor, A, et al., Simultaneous or delayed placement of surface modified and fluoridated dental implants into autogenous block bone grafts: a histologic and biomechanical study in the rabbit. *Clin Implant Dent Relat Res* 2015;17(2):395-401. [Abstract](#)
- de Sanctis, M, Vignoletti, F, Discepoli, N, et al., Immediate implants at fresh extraction sockets: bone healing in four different implant systems. *J Clin Periodontol* 2009;36(8):705-11. [Abstract](#)
- Vignoletti, F, Discepoli, N, Muller, A, et al., Bone modelling at fresh extraction sockets: immediate implant placement versus spontaneous healing. An experimental study in the beagle dog. *J Clin Periodontol* 2012;39(1):91-7. [Abstract](#)
- Cooper, LF, Zhou, Y, Takebe, J, et al., Fluoride modification effects on osteoblast behavior and bone formation at TiO2 grit-blasted c.p. titanium endosseous implants. *Biomaterials* 2006;27(6):926-36. [Abstract](#)
- Dasmah, A, Kashani, H, Thor, A, et al., Integration of fluoridated implants in onlay autogenous bone grafts - an experimental study in the rabbit tibia. *J Craniomaxillofac Surg* 2014;42(6):796-800. [Abstract](#)
- Duyck, J, Corpas, L, Vermeiren, S, et al., Histological, histomorphometrical, and radiological evaluation of an experimental implant design with a high insertion torque. *Clin Oral Implants Res* 2010;21(8):877-84. [Abstract](#)
- Ellingsen, JE, Pre-treatment of titanium implants with fluoride improves their retention in bone. *J Mater Sci Mater Med* 1995;6:749-53. [Abstract](#)
- Meirelles, L, Currie, F, Jacobsson, M, et al., The effect of chemical and nanotopographical modifications on the early stages of osseointegration. *Int J Oral Maxillofac Implants* 2008;23(4):641-7. [Abstract](#)
- Monjo, M, Lamolle, SF, Lyngstadaas, SP, et al., In vivo expression of osteogenic markers and bone mineral density at the surface of fluoride-modified titanium implants. *Biomaterials* 2008;29(28):3771-80. [Abstract](#)
- Thor, AL, Hong, J, Kjeller, G, et al., Correlation of platelet growth factor release in jawbone defect repair--a study in the dog mandible. *Clin Implant Dent Relat Res* 2013;15(5):759-68. [Abstract](#)
- Arvidsson, A, Sarve, H, Johansson, CB, Comparing and visualizing titanium implant integration in rat bone using 2D and 3D techniques. *J Biomed Mater Res B* 2015;103(1):12-20. [Abstract](#)
- Abrahamsson, I, Albouy, JP, Berglundh, T, Healing at fluoride-modified implants placed in wide marginal defects: An experimental study in dogs. *Clin Oral Implants Res* 2008;19(2):153-59. [Abstract](#)
- Berglundh, T, Abrahamsson, I, Albouy, JP, et al., Bone healing at implants with a fluoride-modified surface: an experimental study in dogs. *Clin Oral Implants Res* 2007;18(2):147-52. [Abstract](#)
- Ellingsen, JE, Johansson, CB, Wennerberg, A, et al., Improved retention and bone-to-implant contact with fluoride-modified titanium implants. *Int J Oral Maxillofac Implants* 2004;19(5):659-66. [Abstract](#)
- Bryington, M, Mendonca, G, Nares, S, et al., Osteoblastic and cytokine gene expression of implant-adherent cells in humans. *Clin Oral Implants Res* 2014;25(1):52-8. [Abstract](#)
- Cecchinato, D, Bressan, EA, Toia, M, et al., Osseointegration in periodontitis susceptible individuals. *Clin Oral Implants Res* 2012;23(1):1-4. [Abstract](#)
- Rocci, M, Rocci, A, Martignoni, M, et al., Comparing the TiOblast and Osseospeed surfaces. Histomorphometric and histological analysis in humans. *Oral Implantol (Rome)* 2008;1(1):34-42. [Abstract](#)
- Thaljji, GN, Nares, S, Cooper, LF, Early molecular assessment of osseointegration in humans. *Clin Oral Implants Res* 2014;25(11):1273-85. [Abstract](#)
- Geckili, O, Bilhan, H, Bilgin, T, A 24-week prospective study comparing the stability of titanium dioxide grit-blasted dental implants with and without fluoride treatment. *Int J Oral Maxillofac Implants* 2009;24(4):684-88. [Abstract](#)
- Geckili, O, Bilhan, H, Mumcu, E, et al., Three-year radiologic follow-up of marginal bone loss around titanium dioxide grit-blasted dental implants with and without fluoride treatment. *Int J Oral Maxillofac Implants* 2011;26(2):319-24. [Abstract](#)
- Antunes, AA, Oliveira Neto, P, de Santis, E, et al., Comparisons between Bio-Oss® and Straumann® Bone Ceramic in immediate and staged implant placement in dogs mandible bone defects. *Clin Oral Implants Res* 2013;24(2):135-42. [Abstract](#)
- Bressan, E, Sivoletta, S, Urrutia, ZA, et al., Short implants (6 mm) installed immediately into extraction sockets: an experimental study in dogs. *Clin Oral Implants Res* 2012;23(5):536-41. [Abstract](#)
- Coelho, PG, Granato, R, Marin, C, et al., Biomechanical evaluation of endosseous implants at early implantation times: a study in dogs. *J Oral Maxillofac Surg* 2010;68(7):1667-75. [Abstract](#)
- Faria, PE, Carvalho, AL, de Torres, EM, et al., Effects of early functional loading on maintenance of free autogenous bone graft and implant osseointegration: an experimental study in dogs. *J Oral Maxillofac Surg* 2010;68(4):825-32. [Abstract](#)
- Han, JY, Shin, SI, Herr, Y, et al., The effects of bone grafting material and a collagen membrane in the ridge splitting technique: an experimental study in dogs. *Clin Oral Implants Res* 2011;22(12):1391-8. [Abstract](#)
- Heitz-Mayfield, LJ, Darby, I, Heitz, F, et al., Preservation of crestal bone by implant design. A comparative study in minipigs. *Clin Oral Implants Res* 2013;24(3):243-9. [Abstract](#)
- Jimbo, R, Anchieta, R, Baldassarri, M, et al., Histomorphometry and bone mechanical property evolution around different implant systems at early healing stages: an experimental study in dogs. *Implant Dent* 2013;22(6):596-603. [Abstract](#)

50. Welander, M, Abrahamsson, I, Berglundh, T, Placement of two-part implants in sites with different buccal and lingual bone heights. *J Periodontol* 2009;80(2):324-9. [Abstract](#)
51. Welander, M, Abrahamsson, I, Berglundh, T, Subcrestal placement of two-part implants. *Clin Oral Implants Res* 2009;20(3):226-31. [Abstract](#)
52. Vivan Cardoso, M, Vandamme, K, Chaudhari, A, et al., Dental implant macro-design features can impact the dynamics of osseointegration. *Clin Implant Dent Relat Res* 2015;17(4):639-45. [Abstract](#)
53. Benic, GI, Thoma, DS, Sanz-Martin, I, et al., Guided bone regeneration at zirconia and titanium dental implants: a pilot histological investigation. *Clin Oral Implants Res* 2017;28(12):1592-99. [Abstract](#)
54. Carcuac, O, Abrahamsson, I, Charalampakis, G, et al., The effect of the local use of chlorhexidine in surgical treatment of experimental peri-implantitis in dogs. *J Clin Periodontol* 2015;42(2):196-203. [Abstract](#)
55. Huang, B, Zhang, L, Xu, L, et al., Effect of implant placement depth on the peri-implant bone defect configurations in ligature-induced peri-implantitis: An experimental study in dogs. *Med Oral Patol Oral Cir Bucal* 2018;23(1):e30-e37. [Abstract](#)
56. Kartal, Y, Ucoik, C, Ozgul, O, et al., Effect of locally applied bFGF on implant stability: Biomechanical evaluation of 2 different implant surfaces in rabbits. *Implant Dent* 2014;23(4):463-70. [Abstract](#)
57. Kwon, TK, Lee, HJ, Min, SK, et al., Evaluation of early bone response to fluoride-modified and anodically oxidized titanium implants through continuous removal torque analysis. *Implant Dent* 2012;21(5):427-32. [Abstract](#)
58. Kwon, YS, Namgoong, H, Kim, JH, et al., Effect of microthreads on removal torque and bone-to-implant contact: an experimental study in miniature pigs. *J Periodontol* 2013;43(1):41-6. [Abstract](#)
59. Neldam, CA, Lauridsen, T, Rack, A, et al., Application of high resolution synchrotron micro-CT radiation in dental implant osseointegration. *J Craniomaxillofac Surg* 2015;43(5):682-7. [Abstract](#)
60. Neldam, CA, Sparring, J, Rack, A, et al., Synchrotron radiation muCT and histology evaluation of bone-to-implant contact. *J Craniomaxillofac Surg* 2017;45(9):1448-57. [Abstract](#)
61. Offermanns, V, Comparing SLActive™, Osseospeed™ and a novel strontium releasing surface (Ti-Sr-O) in early osseointegration stages in a rabbit femur model. *Int J Oral Maxillofac Implants* 2015;44(Supplement):e118.
62. Rocci, A, Calcaterra, R, M, DIG, et al., The influence of micro and macro-geometry in term of bone-implant interface in two implant systems: An histomorphometrical study. *Oral Implantol (Rome)* 2015;8(4):87-95. [Abstract](#)
63. Rocci, A, Calcaterra, R, Rocci, M, et al., Different performance of platform switching in equicrestal position implant: An histological study. *Oral Implantol (Rome)* 2016;9(1):11-16. [Abstract](#)
64. Stocchero, M, Toia, M, Jinno, Y, et al., Influence of different drilling preparation on cortical bone: A biomechanical, histological, and micro-CT study on sheep. *Clin Oral Implants Res* 2018;29(7):707-15. [Abstract](#)
65. Alharbi, HM, Babay, N, Alzoman, H, et al., Bone morphology changes around two types of bone-level implants installed in fresh extraction sockets—a histomorphometric study in Beagle dogs. *Clin Oral Implants Res* 2015;26(9):1106-12. [Abstract](#)
66. Huang, B, Meng, H, Zhu, W, et al., Influence of placement depth on bone remodeling around tapered internal connection implants: a histologic study in dogs. *Clin Oral Implants Res* 2015;26(8):942-9. [Abstract](#)
67. Halldin, A, Jinno, Y, Galli, S, et al., Implant stability and bone remodeling up to 84 days of implantation with an initial static strain. An in vivo and theoretical investigation. *Clin Oral Implants Res* 2016;27(10):1310-16. [Abstract](#)
68. Carcuac, O, Abrahamsson, I, Derks, J, et al., Spontaneous progression of experimental peri-implantitis in augmented and pristine bone: A pre-clinical in vivo study. *Clin Oral Implants Res* 2020;31(2):192-200. [Abstract](#)
69. Choi, JY, Kang, SH, Kim, HY, et al., Control variable implants improve interpretation of surface modification and implant design effects on early bone responses: An in vivo study. *Int J Oral Maxillofac Implants* 2018;33(5):1033-40. [Abstract](#)
70. Almohandes, A, Carcuac, O, Abrahamsson, I, et al., Re-osseointegration following reconstructive surgical therapy of experimental peri-implantitis. A pre-clinical in vivo study. *Clin Oral Implants Res* 2019;30(5):447-56. [Abstract](#)
71. Laass, A, Eisner, BM, Hammerle, CHF, et al., Histologic outcomes after guided bone regeneration of peri-implant defects comparing individually shaped block versus particulate bone substitutes. *Int J Periodontics Restorative Dent* 2020;40(4):519-27. [Abstract](#)
72. Abrahamsson, I, Carcuac, O, Berglundh, T, Influence of implant geometry and osteotomy design on early bone healing. A pre-clinical in-vivo study. *Clin Oral Implants Res* 2021;E-pub Aug 06, doi: 10.1111/clr.13816. [Abstract](#)
73. Vandamme, K, Thevissen, K, Mesquita, MF, et al., Implant functionalization with mesoporous silica: A promising antibacterial strategy, but does such an implant osseointegrate? *Clin Exp Dent Res* 2020;E-pub Jan 1 doi:10.1002/cre2.389. [Abstract](#)
74. Stavroullakis, A, Brito, C, Chen, HY, et al., Dental implant surface treatments may modulate cytokine secretion in Porphyromonas gingivalis-stimulated human gingival fibroblasts: a comparative study. *J Biomed Mater Res A* 2015;103(3):1131-40. [Abstract](#)
75. Isa, ZM, Schneider, GB, Zaharias, R, et al., Effects of fluoride-modified titanium surfaces on osteoblast proliferation and gene expression. *Int J Oral Maxillofac Implants* 2006;21(2):203-11. [Abstract](#)
76. Guida, L, Annunziata, M, Rocci, A, et al., Biological response of human bone marrow mesenchymal stem cells to fluoride-modified titanium surfaces. *Clin Oral Implants Res* 2010;21(11):1234-41. [Abstract](#)
77. Guler, B, Uraz, A, Cetiner, D, The chemical surface evaluation of black and white porous titanium granules and different commercial dental implants with energy-dispersive x-ray spectroscopy analysis. *Clin Implant Dent Relat Res* 2019;21(2):352-59. [Abstract](#)
78. Nicolas-Silvente, AI, Velasco-Ortega, E, Ortiz-Garcia, I, et al., Influence of the titanium implant surface treatment on the surface roughness and chemical composition. *Materials (Basel)* 2020;13(2). [Abstract](#)
79. Duddeck, DU, Albrektsson, T, Wennerberg, A, et al., On the cleanliness of different oral implant systems: A pilot study. *J Clin Med* 2019;8(9). [Abstract](#)
80. Hotchkiss, KM, Sowers, KT, Olivares-Navarrete, R, Novel in vitro comparative model of osteogenic and inflammatory cell response to dental implants. *Dent Mater* 2019;35(1):176-84. [Abstract](#)
81. Toia, M, Galli, S, Cecchinato, D, et al., Clinical evidence of osseospeed EV implants: A retrospective study and characterization of the newly introduced system. *Int J Periodontics Restorative Dent* 2019;39(6):863-74. [Abstract](#)
82. Andrade, CX, Quirynen, M, Rosenberg, DR, et al., Interaction between different implant surfaces and liquid fibrinogen: A pilot in vitro experiment. *Biomed Res Int* 2021;2021:9996071. 1. [Abstract](#)
83. Printzell, L, Reseland, JE, Edin, NFJ, et al., Effects of ionizing irradiation and interface backscatter on human mesenchymal stem cells cultured on titanium surfaces. *Eur J Oral Sci* 2019;127(6):500-07. [Abstract](#)
84. Sanz-Martin, I, Paeng, K, Park, H, et al., Significance of implant design on the efficacy of different peri-implantitis decontamination protocols. *Clin Oral Investig* 2021;25(6):3589-97. [Abstract](#)
85. Fahlstedt, P, Banaes, DF, Lie, SA, et al., Dental implant surface temperatures following double wavelength (2780/940 nm) laser irradiation in vitro. *Clin Exp Dent Res* 2020;E-pub Dec 5 doi:10.1002/cre2.369. [Abstract](#)
86. Barewal, RM, Stanford, C, Weesner, TC, A randomized controlled clinical trial comparing the effects of three loading protocols on dental implant stability. *Int J Oral Maxillofac Implants* 2012;27(4):945-56. [Abstract](#)
87. Liaje, A, Ozkan, YK, Ozkan, Y, et al., Stability and marginal bone loss with three types of early loaded implants during the first year after loading. *Int J Oral Maxillofac Implants* 2012;27(1):162-72. [Abstract](#)
88. Su, YH, Peng, BY, Wang, PD, et al., Evaluation of the implant stability and the marginal bone level changes during the first three months of dental implant healing process: A prospective clinical study. *J Mech Behav Biomed Mater* 2020;110:103899. [Abstract](#)
89. Rismanchian, M, Fazel, A, Rakhshan, V, et al., One-year clinical and radiographic assessment of fluoride-enhanced implants on immediate non-functional loading in posterior maxilla and mandible: a pilot prospective clinical series study. *Clin Oral Implants Res* 2011;22(12):1440-5. [Abstract](#)
90. Simmons, DE, Maney, P, Teitelbaum, AG, et al., Comparative evaluation of the stability of two different dental implant designs and surgical protocols—a pilot study. *Int J Implant Dent* 2017;3(1):16. [Abstract](#)
91. Pieri, F, Aldini, NN, Fini, M, et al., Immediate fixed implant rehabilitation of the atrophic edentulous maxilla after bilateral sinus floor augmentation: a 12-month pilot study. *Clin Implant Dent Relat Res* 2012;14 (Suppl 1):e67-82. [Abstract](#)
92. Norton, MR, Astrom, M, The influence of implant surface on maintenance of marginal bone levels for three premium implant brands: A systematic review and meta-analysis. *Int J Oral Maxillofac Implants* 2020;35(6):1099-111. [Abstract](#)
93. Masaki, C, Schneider, GB, Zaharias, R, et al., Effects of implant surface microtopography on osteoblast gene expression. *Clin Oral Implants Res* 2005;16(6):650-6. [Abstract](#)
94. Monjo, M, Petzold, C, Ramis, JM, et al., In vitro osteogenic properties of two dental implant surfaces. *Int J Biomater* 2012;2012:181024. [Abstract](#)
95. Bhatavadekar, NB, Hu, J, Keys, K, et al., Novel application of cytodetachment technology to the analysis of dental implant surfaces. *Int J Oral Maxillofac Implants* 2011;26(5):985-90. [Abstract](#)
96. Lamolle, SF, Monjo, M, Rubert, M, et al., The effect of hydrofluoric acid treatment of titanium surface on nanostructural and chemical changes and the growth of MC3T3-E1 cells. *Biomaterials* 2009;30(5):736-42. [Abstract](#)
97. Saghir, MA, Ghasemi, M, Moayer, AR, et al., A novel method to evaluate the neurocompatibility of dental implants. *Int J Oral Maxillofac Implants* 2014;29(1):41-50. [Abstract](#)

Dentsply Sirona

Deutschland

DENTSPLY IH GmbH
Steinzeugstraße 50, 68229 Mannheim, Deutschland
implants@dentsplysirona.com

☎ DE: 06251 16-1610

Lieferadresse Pakete und Päckchen
Dentsply Sirona Deutschland GmbH
Fabrikstraße 39, 64625 Bensheim, Deutschland

Lieferadresse Briefe und Unterlagen
Dentsply Sirona Deutschland GmbH
Fabrikstraße 31, 64625 Bensheim, Deutschland

Österreich

Dentsply Sirona Austria GmbH
Wienerbergstrasse 11 / Turm A / 27. Stock, 1100 Wien, Österreich
bestellung.austria@dentsplysirona.com

☎ AT: 01 600 4930-301

Schweiz

Dentsply Sirona (Schweiz) AG
Täferweg 1, 5405 Baden-Dättwil, Schweiz
implants-ch-info@dentsplysirona.com

☎ CH: 0800 845-844

Besuchen Sie uns auf:  [dentsplysirona.com](https://www.dentsplysirona.com)  facebook.com/dentsplysirona  [dentsplysirona.de](https://www.instagram.com/dentsplysirona)

© Dentsply Sirona Inc 2021, Alle Rechte vorbehalten.