Supplementary File S3. Reports and records excluded, with reasons

Manuscript: Silicon Nitride Coatings on Dental and Orthopedic Implants: A Systematic Review of Preclinical Studies.

A. Full-text reports excluded (PRISMA 2020 item 16b): 16 reports

No.	Source	Title	Journal	Year	DOI	Reason for exclusion
1	Databases and registers	Effects of N/Si ratio on mechanical properties of amorphous silicon nitride coating	Materials Research Express	2023	10.1088/2053-1591/ad0eac	Coating deposited on silicon wafers only, not on an implant-relevant substrate; mechanical and tribological outcomes only (LPCVD silicon nitride; hardness about 27 GPa; modulus 290 GPa)
2	Databases and registers	Properties of SiCN Films Relevant to Dental Implant Applications	MATERIALS	2023	10.3390/ma16155318	Coating deposited on silicon substrates only, not on an implant-relevant substrate; film composition, optical, contact angle and corrosion measured (SiCN by PECVD)
3	Databases and registers	Si-Fe-C-N Coatings for Biomedical Applications: A Combinatorial Approach.	Materials	2020	10.3390/ma13092074	Coating deposited on silicon wafers only, not on an implant-relevant substrate; MC3T3 cell adhesion tested on the coated wafers (borderline)
4	Databases and registers	A Comparison of the Structural, Mechanical, and Corrosion Properties of Hybrid Coating Systems Based on Graphene and Silicon Nitride Thin Film Deposited on Titanium Alloy Surfaces in Two Different Compositions	SOCIETY OF VACUUM COATERS 59TH ANNUAL TECHNICAL CONFERENCE PROCEEDINGS, 2016	2016	10.14332/svc16.proc.0069	Silicon nitride and graphene hybrid coating on Ti6Al4V with no implant or biomedical application stated; corrosion tested in an acidic NaCl/KF medium (conference paper; overlaps R042). Borderline.
5	Databases and registers	Comparison of the structural and corrosion properties of the graphene/SiN(200) coating system deposited on titanium alloy surfaces covered with SiN transition layers	SURFACE & COATINGS TECHNOLOGY	2016	10.1016/j.surfcoat.2016.04.064	SiN/graphene/SiN coating on Ti6Al4V; the paper states industrial applications and no implant application; corrosion tested in acidic NaCl/KF medium; overlaps R038, R040, R042. Borderline.
6	Databases and registers	Determination of structural, mechanical and corrosion properties of titanium alloy surface covered by hybrid system based on graphene monolayer and silicon nitride thin films	THIN SOLID FILMS	2015	10.1016/j.tsf.2015.04.005	SiN, SiN/graphene and graphene/SiN hybrid coatings on Ti6Al4V (Thin Solid Films 583:212-220); mentions biocompatibility in general terms but no implant or biomedical application; corrosion tested in acidic NaCl/KF medium; overlaps R038, R039, R040 and R042. Borderline.
7	Databases and registers	Determination of Structural, Mechanical and Corrosion Properties of Titanium Alloy Covered by Thin Films Based on Graphene and Silicon Nitride	E-JOURNAL OF SURFACE SCIENCE AND NANOTECHNOLOGY	2015	10.1380/ejssnt.2015.289	Silicon nitride and graphene coatings on titanium alloy with no implant or biomedical application stated; corrosion tested in an acidic NaCl/KF medium (overlaps R038). Borderline.

8	Databases and registers	Structure and composition of silicon nitride and silicon carbon nitride coatings for joint replacements	Surface and Coatings Technology	2013	10.1016/j.surfcoat.2013.09.008	Coating deposited on silicon wafers only, not on an implant-relevant substrate (all coatings on Si(001) wafers); stated long-term aim is hip bearing surfaces on CoCr. Borderline.
9	Databases and registers	SiCNO Ceramic Coatings on Surface-Treated Ti-6Al-4V for Fretting Corrosion Protection	Advanced Engineering Materials	2026	10.1002/adem.202502194	SiCNO (polymer-derived silicon oxycarbonitride) coating: an oxygen-bearing compound outside the registered Si3N4, SiNx and SiCN scope; no silicon nitride phase characterized (borderline)
10	Databases and registers	Enhancing the Hydrophobicity and Antibacterial Properties of SiCN-Coated Surfaces with Quaternization to Address Peri-Implantitis	Materials (Basel)	2023	10.3390/ma16175751	SiCN (100 nm, PECVD) on silicon wafers only; not an implant-relevant substrate
11	Databases and registers	Investigation of silicon carbon nitride nanocomposite films as a wear resistant layer in vitro and in vivo for joint replacement applications	Colloids Surf B Biointerfaces	2017	10.1016/j.colsurfb.2017.02.010	Silicon-containing carbon nitride (CNx) films on Ti6Al4V: the coating is carbon nitride with a silicon dopant, a different coating material from silicon nitride (borderline)
12	Other methods	Biological responses to silicon and nitrogen-rich PVD silicon nitride coatings	Materials Today Chemistry 2021;19:100404		10.1016/j.mtchem.2020.100404	PVD SixNy coatings deposited on mirror-polished silica glass (and silicon witness coupons), not on an implant-relevant substrate. Borderline.
13	Other methods	Evaluation of silicon nitride as a wear resistant and resorbable alternative for total hip joint replacement	Biomatter 2012;2(2):94-102		Not confirmed	Bulk and powder silicon nitride (dissolution in PBS, wear of Si3N4 against Si3N4, plasma adsorption); not a coating.
14	Other methods	KUSA-A1 mesenchymal stem cells response to PEEK-Si3N4 composites	Mater Today Chem 2020;17:100316		10.1016/j.mtchem.2020.100316	PEEK-Si3N4 bulk composite material (silicon nitride particles mixed through the polymer), not a coating on a substrate.
15	Other methods	Evaluation of MEMS materials of construction for implantable medical devices	Biomaterials 2002;23:2737-2750			Biocompatibility of MEMS materials for implantable devices (not dental or orthopedic implants; no implant coating).
16	Other methods	Corrosion of stainless steel and its prevention through surface modification for biomedical application: a review	Asian J Eng Appl Technol 2018;7(S2):60-66			Review article; not a study of a silicon nitride coating.

B. Records excluded at title and abstract by the third reviewer after the two reviewers disagreed or were both unsure (n = 10)

The arbiter's entries were drafted with AI assistance and were reviewed and approved by the arbiter (Prof. Alqahtani). Four further records were sent to full-text assessment: three were included (Moskalewicz 2022, Pezzotti 2019, Shi 2012) and one was excluded (R051, listed in part A). Full texts of four of the excluded records (R145, R153, R198, R298) were read afterwards and confirmed the arbiter's decisions.

No.	ID	Title	Journal	Year	Arbiter reason

1	R052	Influence of Nitrogen Gas Flow Rate on Electrochemical and Tribological Properties of MoSiN Thin Films in Hank’s Solution	Zhongguo Biaomian Gongcheng/China Surface Engineering	2026	MoSiN coating is a different nitride compound, not a specified Si3N4/SiNx/SiCN-based coating.
2	R145	Breath Figures decorated silicon oxinitride ceramic surfaces with controlled Si ions release for enhanced osteoinduction	Journal of Biomedical Materials Research - Part B Applied Biomaterials	2019	Coating is silicon oxynitride (SiON), not an eligible Si3N4/SiNx/SiCN-based coating under the stated rule.
3	R153	Microstructure, adhesion, in vitro corrosion resistance and tribological behavior of (Si:N)-DLC coated pure Ti	DIAMOND AND RELATED MATERIALS	2019	Exposed functional coating is DLC; Si3N4 is an interlayer, explicitly excluded by the registered criteria.
4	R154	Development of a SiYAlON glaze for improved osteoconductivity of implantable medical devices.	Journal of Biomedical Materials Research. Part B, Applied Biomaterials	2018	SiYAlON oxynitride glaze is a different coating compound; not an eligible Si3N4/SiNx/SiCN-based coating.
5	R177	Biomineralisation with Saos-2 bone cells on TiSiN sputtered Ti alloys	Colloids and Surfaces B: Biointerfaces	2017	TiSiN titanium silicon nitride is a different compound, not an eligible named Si3N4/SiNx/SiCN-based coating.
6	R198	Enhanced Interfacial Adhesion and Osteogenesis for Rapid "bone-like" Biomineralization by PECVD-Based Silicon Oxynitride Overlays	ACS Applied Materials and Interfaces	2015	SiON/SiNx biological coatings are tested on silicon wafer models, not an implant-relevant substrate; SiON also outside stated composition scope.
7	R298	Silicon nitride coating on titanium to enable titanium-ceramic bonding	Journal of Biomedical Materials Research	1999	Si3N4 film is used for titanium–porcelain bonding in dental restorations rather than a dental/orthopedic implant application.
8	M051	[Histomorphometry of silicon nitride composite endosteal implant in dogs]	Zhonghua Kou Qiang Yi Xue Za Zhi	1999	PubMed describes Si3N4–HA and bulk Si3N4 endosteal implants in dogs, not a coating deposited on implant substrate.
9	M060	Characteristics of Si (C,N) Silicon Carbonitride Layers on the Surface of Ni-Cr Alloys Used in Dental Prosthetics	Materials (Basel)	2024	Si(C,N) films applied to Ni–Cr dental prosthetic alloys, not an implant application; prosthesis/restoration excluded.
10	M093	Electrophoretic deposition of CaP-TiSiN composite coatings on 316L stainless steel: corrosion resistance and in vitro cytocompatibility	J Med Eng Technol	2026	CaP–TiSiN is titanium silicon nitride composite coating, not specified silicon nitride (Si3N4/SiNx/SiCN) functional component.