Supplementary File S2. Item-level RoBDEMAT judgments for the laboratory studies

Manuscript: Silicon Nitride Coatings on Dental and Orthopedic Implants: A Systematic Review of Preclinical Studies. SR, sufficiently reported; IR, insufficiently reported; NR, not reported. IDs beginning with O come from other methods. First drafts prepared with AI assistance and then rated independently by one reviewer (M.A.K.). Overall category: High if the control group or standardized testing was not reported; Low if all nine items were sufficiently reported; otherwise Moderate (rule fixed retrospectively).

ID	Study	D1 Control group	D1 Randomization	D1 Sample-size rationale	D2 Specimen standardization	D2 Identical conditions	D3 Standardized testing	D3 Blinding	D4 Statistical analysis	D4 Outcome reporting	Overall
R001	SiN nanofilms on titanium mesh (Yuan 2026)	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R003	Bioinspired Hierarchical PEEK and Amorphous Silicon Nitride Composite	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R004	Effect of Silicon Nitride Coating on Titanium Surface on the Expressio	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R005	Hybrid-manufactured silicon nitride coated CFR-PEKK: A candidate bioma	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R007	Effect of Silicon Nitride Coating on Titanium Surface: Biocompatibilit	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R008	Ti6Al4V coated with Si3N4/ND nanoparticles (Esmaeili 2024)	SR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
R009	Investigation on the Osteogenic and Antibacterial Properties of Silico	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R010	Osteoblast Growth in Quaternized Silicon Carbon Nitride Coatings for D	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R011	Mechanical properties and biocompatibility of multilayer systems based	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R012	SiNx Coating Deposition on CoCr by Plasma-Enhanced Chemical Vapor Depo	IR	NR	NR	IR	IR	IR	NR	SR	IR	Moderate
R014	Fe and C additions decrease the	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate

	dissolution rate of silicon nitride co										
R017	Effect of Laser Treatment on Surface and Interface of Silicon Nitride	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R019	Improvement in osteogenesis, vascularization, and corrosion resistance	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R020	Tailoring the dissolution rate and in vitro cell response of silicon n	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate
R021	A microporous surface containing Si3N4/Ta microparticles of PEKK exhib	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R022	Promoting osteoblasts responses in vitro and improving osteointegratio	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R024	Do SiNx coatings bear the potential to reduce the risk of micromotion	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate
R025	3D-additive deposition of an antibacterial and osteogenic silicon nitr	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate
R026	Silicon nitride laser cladding: A feasible technique to improve the bi	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R027	In vitro comparison of bioactive silicon nitride laser claddings on di	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R028	The effect of N, C, Cr, and Nb content on silicon nitride coatings for	IR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate
R029	Effects of a Coating of Nano Silicon Nitride on Porous Polyetheretherk	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R030	Microporous Coatings of PEKK/SN Composites Integration with PEKK Exhib	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R031	The effect of coating density on functional properties of SiNx coated	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate

R032	Towards functional silicon nitride coatings for joint replacements	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate
R033	A hierarchical nanostructural coating of amorphous silicon nitride on	SR	NR	NR	SR	SR	IR	NR	IR	SR	Moderate
R034	Influence of substrate heating and nitrogen flow on the composition, m	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R035	Laser Cladding of Composite Bioceramic Coatings on Titanium Alloy	SR	NR	NR	SR	SR	IR	NR	NR	IR	Moderate
R036	Dissolution behaviour of silicon nitride coatings for joint replacemen	SR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
R037	Morphology and Dissolution Rate of Wear Debris from Silicon Nitride Co	IR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
R040	The hybrid graphene multilayer system (graphene/SiN/graphene) coupled	SR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
R043	Mechanical and tribological behavior of silicon nitride and silicon ca	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate
R044	Bio-inspired citrate-functionalized apatite thin films crystallized on	SR	NR	NR	SR	SR	IR	NR	NR	IR	Moderate
R046	Fabrication and evaluation of Si xN y coatings for total joint replace	SR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
O01	Surface functionalization of polyethylene by silicon nitride laser cla	SR	NR	NR	SR	SR	IR	NR	NR	SR	Moderate
O04	SiNx coatings deposited by reactive HiPIMS: residual coating stress	IR	NR	NR	SR	SR	SR	NR	NR	SR	Moderate
O07	Surface functionalization of PEEK with silicon nitride (Boschetto 2021	SR	NR	NR	SR	SR	IR	NR	SR	SR	Moderate
R002	Wang 2026 (Compositional tailoring of amorphous SiNx films on titanium	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate
R006	Heydarian 2025 (EPD of Si3N4	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate

	nanoparticles on anodized Ti-6Al-4V)										
R016	Guo 2023 (MAO coatings with Si3N4 nanoparticles on titanium)	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate
R108	Moskalewicz 2022 (Si3N4 and CuO nanoparticles in EPD coatings on Ti-13	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate
R149	Pezzotti 2019 (ZTA with Si3N4 and bioglass)	SR	NR	NR	SR	SR	SR	NR	SR	SR	Moderate
R222	Shi 2012 (F:SiCN and SiNO films on CoCrMo)	SR	NR	NR	SR	SR	SR	NR	IR	SR	Moderate