





Figure S11: The XRD patterns of carburized specimens in different cooling conditions and reaction time; (a) A-1 to A-3; (b) B-1 to B-3; (c) C-1 to C-3; (d) D-1 to D-3; (e) E-1 to F-3 (the specific number are illustrated in Tables 2 and 3 in the paper)

Table S1 ASTM card, crystal system, and diffraction peak of materials detected in this work

Material	Number of ASTM card	Crystal system	Characteristic peak	
			hkl	2θ(deg)
Fe ₃ C	00-035-0772	Orthorhombic	121	37.63
Fe	01-089-7194	Cubic	211	82.34
C	00-001-0640	Hexagonal	002	26.35
SiO ₂	01-086-1628	Hexagonal	101	26.69