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**Fig. 6.13** Oxide scale morphology and variation of elemental composition across the cross-section of the 65% Cr$_2$C$_2$ -35% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

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**Fig. 6.15** Oxide scale morphology and variation of elemental composition across the cross-section of the 80% Cr$_2$C$_2$ -20% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

**Fig. 6.16** Oxide scale morphology and variation of elemental composition across the cross-section of the 90% Cr$_2$C$_2$ -10% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.
Fig. 6.17  Composition image (SEI) and X-ray mappings of the cross-section of the uncoated T-91 boiler tube steel subjected to actual boiler environment at 850°C for 1500 hours.

Fig. 6.18  Composition image (SEI) and X-ray mappings of the cross-section of the 65% Cr₃C₂ -35% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

Fig. 6.19  Composition image (SEI) and X-ray mappings of the cross-section of the 75% Cr₃C₂-25% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

Fig. 6.20  Composition image (SEI) and X-ray mappings of the cross-section of the 80% Cr₃C₂-20% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

Fig. 6.21  Composition image (SEI) and X-ray mappings of the cross-section of the 90% Cr₃C₂ -10% (Ni-20Cr) coated T-91 boiler tube steel sample subjected to actual boiler environment at 850°C for 1500 hours.

Fig. 7.1  Thickness loss of uncoated T-91 at different sample temperature and impingement angles during erosion testing.

Fig. 7.2  SEM micrographs showing surface morphology of the eroded surfaces of uncoated T-91 boiler tube steel at: (a) Room temperature and 30° (b) Room temperature and 90° (c) 200°C and 30° (d) 200°C and 90° impingement angle.

Fig. 7.3  SEM micrographs showing surface morphology of the eroded surfaces of uncoated T-91 boiler tube steel at: (a) 400°C and 30° (b) 400°C and 90° (c) 600°C and 30° and (d) 600°C and 90° impingement angle.

Fig. 7.4  Thickness loss of 65% Cr₃C₂ - 35% (Ni-20Cr) coated T-91 boiler tube steel at different sample temperature and impingement angles during erosion testing.

Fig. 7.5  SEM micrographs showing surface morphology of the eroded surfaces of 65%Cr₃C₂ -35% (Ni-20Cr) Coated T-91 boiler tube steel at (a) Room temperature and 30° (b) Room temperature and 90° (c) 200°C and 30° (d) 200°C and 90° impingement angle

Fig. 7.6  SEM micrographs showing surface morphology of the eroded surfaces of 65%Cr₃C₂ -35% (Ni-20Cr) Coated T-91 boiler tube steel at (a) 400°C and 30° (b) 400°C and 90° (c) 600°C and 30°
Fig. 7.7  Thickness loss of the 75% Cr$_3$C$_2$ - 25% (Ni-20Cr) coated T-91 boiler tube steel at different sample temperature and impingement angles during erosion testing.

Fig. 7.8  SEM micrographs showing surface morphology of the 75% Cr$_3$C$_2$-25% (Ni-20Cr) coated sample surfaces at: (a) Room temperature at 30° (b) Room temperature at 90° (c) 200°C at 30° (d) 200°C with 90° impingement angle

Fig. 7.9  SEM micrographs showing surface morphology of the 75% Cr$_3$C$_2$-25% (Ni-20Cr) coated sample surfaces at: (a) Room temperature at 30° (b) Room temperature at 90° (c) 600°C with 30° and (d) 600°C with 90° impingement angle

Fig. 7.10 Thickness loss of the 80% Cr$_3$C$_2$ - 20% (Ni-20Cr) coated T-91 boiler tube steel at different sample temperature and impingement angles during erosion testing.

Fig. 7.11  SEM micrographs showing surface morphology of the 80% Cr$_3$C$_2$-20% (Ni-20Cr) coated sample surfaces at: (a) Room temperature at 30° (b) Room temperature at 90° (c) 200°C at 30° (d) 200°C with 90° impingement angle

Fig. 7.12  SEM micrographs showing surface morphology of the 80% Cr$_3$C$_2$-20% (Ni-20Cr) coated sample surfaces at (a) 400°C with 30° (b) 400°C with 90° (c) 600°C with 30° and (d) 600°C with 90° impingement angle

Fig. 7.13 Thickness loss for 90% Cr$_3$C$_2$ -10% (Ni-20Cr) coated T-91 boiler tube steel at different sample temperature and impingement angles during erosion testing.

Fig. 7.14  SEM micrographs showing surface morphology of the 90% Cr$_3$C$_2$-10% (Ni-20Cr) coated sample surfaces at (a) Room temperature at 30° (b) Room temperature at 90° (c) 200°C at 30° (d) 200°C with 90° impingement angle

Fig. 7.15  SEM micrographs showing surface morphology of the 90% Cr$_3$C$_2$-10% (Ni-20Cr) coated sample surfaces at (a) 400°C with 30° (b) 400°C with 90° (c) 600°C with 30° and (d) 600°C with 90° impingement angle

Fig. 8.1  Bar chart showing cumulative weight gain of the coatings during cyclic hot corrosion in aggressive environment of molten salt of Na$_2$SO$_4$-60% V$_2$O$_5$ at 550°C in laboratory.

Fig. 8.2  Bar chart showing cumulative weight gain of the coatings during
cyclic hot corrosion in aggressive environment of molten salt of
Na$_2$SO$_4$-60% V$_2$O$_5$ at 700°C in laboratory.

**Fig. 8.3** Bar chart showing cumulative weight gain of the coatings during
cyclic hot corrosion in aggressive environment of molten salt of
Na$_2$SO$_4$-60% V$_2$O$_5$ at 850°C in laboratory.

**Fig. 8.4** Bar chart showing thickness loss of the coatings during air jet
erosion testing for 30° and 90° impingement angle for room
temperature, 200°C, 400°C and 600°C sample temperatures.

**Fig. 8.5** Thickness loss of the coatings during erosion-corrosion (E-C) at
850°C in actual boiler environment.