

**----- GENERAL INFORMATION -----**

DATA TITLE: SEM/EDS analysis cross-sectioned segments of ferritic Fe-Cr-Al-Mo alloy Kanthal APMT and Cr-Mo-V steel T91 (UNS: K90901) after oxidation at 1200 C for 2 h

PROJECT TITLE: Materials Characterization of High-Temperature Oxidation on ferritic Fe-Cr-Al-Mo alloy Kanthal APMT and Cr-Mo-V steel T91 (UNS: K90901)

DATA ABSTRACT: Images of cross-sectioned segments extracted from ferritic Fe-Cr-Al-Mo alloy Kanthal APMT and Cr-Mo-V steel T91 (UNS: K90901) after oxidation at 1200 C for 2 h in steam and air. Backscattered electron images (BSE) included for all specimens were captured using a JEOL 7600F scanning electron microscope (SEM). Optical micrograph is included of steam-oxidized T91 acquired with a Nikon MM-40 optical microscope. Each microscope image is accompanied by an energy-dispersive x-ray spectroscopy (EDS) elemental map depicting the distribution of elements Al, O, and Fe for APMT and Cr, Fe, and O for T91.

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#### ASSOCIATED PUBLICATIONS:

T. Copeland-Johnson, C.K.A. Nyamekye, S.K. Gill, L. Ecker, N. Bowler, E.A. Smith, R.B. Rebak, Characterization of Kanthal APMT and T91 oxidation at beyond design-basis accident temperatures, Corros. Sci. (2020).

#### COLLECTION INFORMATION:

Time period(s): 2017-2019

Location(s): Iowa State University, Brookhaven National Laboratory

#### ----- FILE DIRECTORY -----

#### ----- FILE LIST-----

| File Name           | Description  |
|---------------------|--|
| EDS_APMT_Air.jpg    | BSE image taken at a cross-section of Kanthal APMT after oxidation in air      |
| EDS_APMT_Air_Al.jpg | EDS elemental map generated showing the distribution of Al in EDS_APMT_Air.jpg |
| EDS_APMT_Air_Fe.jpg | EDS elemental map generated showing the distribution of Fe in EDS_APMT_Air.jpg |

|                       |  |
|-----------------------|--|
| EDS_APMT_Air_O.jpg    | EDS elemental map generated showing the distribution of O in EDS_APMT_Air.jpg          |
| EDS_APMT_Steam.jpg    | BSE image taken at the cross-section of Kanthal APMT after oxidation in steam          |
| EDS_APMT_Steam_Al.jpg | EDS elemental map generated showing the distribution of Al in EDS_APMT_Steam.jpg       |
| EDS_APMT_Steam_Fe.jpg | EDS elemental map generated showing the distribution of Fe in EDS_APMT_Steam.jpg       |
| EDS_APMT_Steam_O.jpg  | EDS elemental map generated showing the distribution of O in EDS_APMT_Steam.jpg        |
| EDS_T91_Air_1.jpg     | BSE image taken at the cross-section of T91 after oxidation in air                     |
| EDS_T91_Air_1_Cr.jpg  | EDS elemental map generated showing the distribution of Cr in EDS_T91_Air_1.jpg        |
| EDS_T91_Air_1_Fe.jpg  | EDS elemental map generated showing the distribution of Fe in EDS_T91_Air_1.jpg        |
| EDS_T91_Air_1_O.jpg   | EDS elemental map generated showing the distribution of O in EDS_T91_Air_1.jpg         |
| EDS_T91_Air_2.jpg     | BSE image taken at the cross-section of T91 after oxidation in air                     |
| EDS_T91_Air_2_Cr.jpg  | EDS elemental map generated showing the distribution of Cr in EDS_T91_Air_2.jpg        |
| EDS_T91_Air_2_Fe.jpg  | EDS elemental map generated showing the distribution of Fe in EDS_T91_Air_2.jpg        |
| EDS_T91_Air_2_O.jpg   | EDS elemental map generated showing the distribution of O in EDS_T91_Air_2.jpg         |
| EDS_T91_Steam.jpg     | BSE image taken at the cross-section of T91 after oxidation in steam                   |
| EDS_T91_Steam_Cr.jpg  | EDS elemental map generated showing the distribution of Cr in EDS_T91_Steam.jpg        |
| EDS_T91_Steam_Fe.jpg  | EDS elemental map generated showing the distribution of Fe in EDS_T91_Steam.jpg        |
| EDS_T91_Steam_O.jpg   | EDS elemental map generated showing the distribution of O in EDS_T91_Air_2.jpg         |
| Optical_T91_Steam.tif | Optical micrograph image acquired from a cross-section of T91 after oxidation to steam |

## ----- METHODS AND MATERIALS -----

### ----- SOFTWARE -----

Name: INCA™ - The Microanalysis Suite

Version: 4.15

System Requirements: N/A

URL: <https://www.oxinst.com>

Developer: Oxford Instruments

Additional Notes: N/A

### ----- EQUIPMENT -----

Manufacturer: JEOL

Model: 7600F

Embedded Software/Firmware Name: (if applicable) N/A

Embedded Software/Firmware Version: (if applicable) N/A

Additional Notes: Equipped with Oxford Instruments EDS 80 mm<sup>2</sup> X-Max silicon drift detector (129 eV resolution) operated through the INCA software suite.

Manufacturer: Nikon

Model: MM-40

Embedded Software/Firmware Name: (if applicable) N/A

Embedded Software/Firmware Version: (if applicable) N/A

Additional Notes: Equipped with Digital Sight DS-2Mv camera

## ----- LICENSING -----

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