

## Intergranular erosion corrosion of pure copper in flowing NaCl solution

**Lei Wu**<sup>1</sup>, AiLi Ma<sup>1</sup>, Lianmin Zhang<sup>1</sup>, Yugui Zheng<sup>1</sup>

*<sup>1</sup>Institute of Metal Research, Chinese Academy of Sciences, 62 Wencui Road, Shenyang, 110016, PR China*

**Abstract** The erosion corrosion behavior of commercial copper tube in 1 wt.% NaCl solution is investigated by using a self-built loop apparatus. Combines in-situ electrochemical monitoring and ex-situ fine characterization of corrosion morphology after 10 days' erosion corrosion test at different flow velocities, which allows to comprehensively reveal the effects of flow velocity on corrosion layer evolution that explains the flow velocity dependent corrosion rate of copper tubes in application. Furthermore, the intergranular erosion corrosion forms the detached and partially oxidized copper grains with nut structure. From core to shell, the compositions are supposed to be copper, copper-based oxygen solid solution, Cu<sub>2</sub>O with oxygen vacancies, Cu<sub>2</sub>O, and Cu<sub>2</sub>O with copper vacancies. These findings provide deepened understanding of erosion corrosion behavior of copper and copper alloys.

**Keywords** Copper, Erosion, Intergranular corrosion