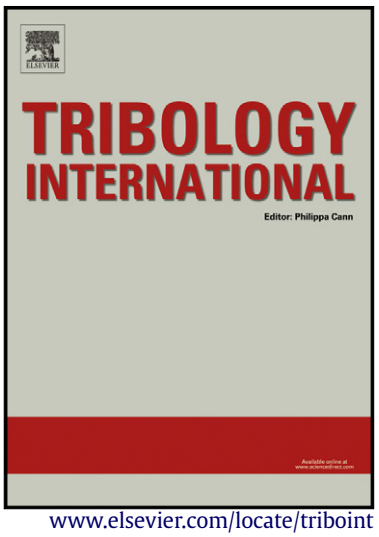

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Wear debris from brake system materials: A multi-analytical characterization approach.

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Abstract

In this work a streamline characterization protocol for debris coming from wear tests on materials used for disc brake assemblies is presented. An important aspect of the methodology concerns powder collection involving aluminum foil, for a gravitational collection, and polycarbonate filters of an impactor, on which particles are selectively trapped, according to their size. The protocol is based on the application of scanning and transmission electron microscopy, X-ray spectroscopy, X-ray and selected area electron diffraction. The aim of the study was to identify selection parameters, like specimen availability and average particle size, for an effective and smart application of the techniques.

Highlights

- Debris from brake assemblies are becoming an important environmental issue.
- Debris particle size range from nanometric up to micrometric interval.
- Phase and chemical compositions are generally rather complex.
- We developed a characterization protocol for debris involving several techniques.
- We suggest criteria to adopt suitable test strategies for this sort of specimens.

Keywords Wear debris; frictional sliding; scanning electron microscopy; transmission electron microscopy.

1. Introduction

Brakes dissipate energy by converting rotational motion into heat. Disc brakes slow the rotational motion of automobile wheels with friction caused by a brake pad pushing against a brake disc. During this operation, both brake pad and counterface disc wear out, releasing huge amount of wear debris in the surrounding atmosphere. These hazardous wear debris need to be addressed in order to