# Tracing sources of industrial waste and anthropogenic pollution using Sr, Nd and Pb isotopes

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Industrial activities, such as steel smelting and ore refining, produce large amounts of metal wastes, which are potentially harmful to the environment. Illegally dumpings of smelting slags and metallic dust being dispersed out from steel plants, have caused serious heavy metal pollutions in Taiwan. The multi-isotope tracer study has been proposed as a novel approch for environmental forensics over the last two decades[1], and the present work, therefore, aims at further extending the application for source idenfication of steel smelting slags.

To study sources of metal wastes produced by steel smelting plants, Sr-Nd-Pb isotopic compositions of slag samples from three steel plants (LC, LD and CS) were analyzed. The Sr isotope ratios range from 0.708413 to 0.709838 and 0.708474 to 0.709292 for reductive and oxidative slags, respectively. These slag samples have highly variable $\varepsilon_{Nd}$ values (-9.5 to -14.2 and -7.2 to -14.3) for reductive and oxidative slags, repectively. The $^{206}Pb/^{207}Pb$ isotope ratios are 1.1574-1.1736 for the reductive slags and 1.1627-1.1727 for the oxidative slags. The characterization of the three steel plants show that they can be discriminated by the multi-isotope approach. The measured Sr-Nd-Pb isotopes among the three smelting plants most likely reflect different sources of fluorite and dolomite that were added during the refining processes. Our results suggest that the Sr-Nd-Pb isotope ratios in slags can be used as a powerful tracer for source identification of industrial metal wastes..

Future work will be focused on the analyses of materials added as slag medium and other industrial aerosols. Preliminary results will be presented during the conference.

[1] Lahd Geagea *et al*. (2008) *Environ. Sci. Technol.* **42**, 692-698.