Environmental Science

This section covers wide topics reported by researchers working in a vast variety of disciplines. They may not have common terminologies. They may talk about their own science and technology by using the same words but with different meanings. However, there is an important objective in common: they are all aiming at a better and healthier environment for us and our posterity.

The first topic by Nishihata *et al.* is concerning a new catalyst for exhaust gas from automotive engines. As is well known, the catalyst converts the air-pollutant-emission to harmless gas. The drawbacks of the catalysts used today are their limited life and requirement of large amounts of precious metals. Here is a new catalyst that seems to have an eternal life and is expected to dramatically reduce the demand for the precious metals. The authors describe how this catalyst works.

The next topic also concerns the reduction of the exhaust gas from automobiles. The ultimate goal of absolutely non-air-polluting vehicles is now within our reach. Last year Japanese automobile makers sent fuel-cell-powered passenger cars to the market. The fuel-cell is fed with hydrogen gas, an energy source, but then the car needs a hydrogen gas storage tank. Noritake is searching for efficient hydrogen storage materials. He describes here how hydrogen is stored in magnesium hydride, which is one of the candidate materials. Such knowledge, he believes, will orient us toward finding better materials.

Another environmental hazard we are confronted with is heavy metal ions leaching out from incinerator residue. Since the daily accumulation of residue is huge, trace amounts of hazardous ions emanating from it can be a problem for us. Tsuyumoto analyses the chemical state of heavy metal ions in cement. Cement has been widely used to solidify the incinerator ash, and therefore, one must know the chemical state of the ions to predict the long term stability of residue in cement.

The last report concerns DNA damage by photo-irradiation. Yokoya *et al.* installed an EPR spectrometer in a beamline. Their EPR system detected radicals as transient species when the DNA bases were irradiated with soft X-rays. They think that these are the keys to solving the baffling problem of how the genetic transformations relevant to mutation and carcinogenesis occur.

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