Correlations of Particle Mass and Particle Number with PMP Method

Hiroyuki YAMADA
National Traffic Safety and Environment Laboratory
E:mail  h-yamada@ntsel.go.jp

**Introduction**
- Europe adopted particle number (PN) counting method to type approval test to reduce particle emissions form HD-diesel, LD-diesel and LD-gasoline DI cars.
- The United states stated to introduce more powerful PM regulation (1mg/mile) to reduce particle emissions.

There are two method to reduce particle emissions from vehicles. But how is the correlation?

**Objective**
- Comparing the PM and PN emissions from LD DPF diesel, gasoline DI and gasoline MPI.
- Comparing the PM and PN emissions from HD DPF diesel

**Tested Vehicles**
- DPF-Diesel
- Gasoline-DI
- MPI
- HD-DPF

**Results**
- LD vehicles (PN > 23nm)
  - PN limit in EU (G-DI, -2017)
  - PN limit in Japan
  - G-DI and MPI exhibited good (2 stage linear) correlation.
  - There was no correlation in the case of DPF diesel

- LD vehicles (PN > 2.5nm)
  - Particle over 2.5 nm results were similar to those of over 23 nm

- HD-DPF-Diesel
  - There was no correlation in the case of HD DPF diesel.

**Current and future PM regulation for LD vehicles**

<table>
<thead>
<tr>
<th></th>
<th>US</th>
<th>EU</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>PM</td>
<td>PN</td>
<td>PM</td>
</tr>
<tr>
<td>Limit</td>
<td>0.63 (from 2021)</td>
<td>0.45 (started)</td>
<td>5 (no update)</td>
</tr>
</tbody>
</table>

How should we do in the future?