Silicon post-etch-process residue removal

Overview
With improvements in both dry-etch equipment and process capability, the "Bosch process" has become instrumental for a multitude of devices. The devices that use this process include silicon power devices, capacitors, through silicon vias (TSV) for 2.5D and 3D advanced packaging and nanotechnology where deep-trench features with high aspect ratios are required.

Challenge
The Bosch process, or deep reactive-ion etching (DRIE), creates etched features by cycling through a two-stage process composed of an etch step and a passivation step. The passivation step aids in maintaining the directionality of the etched feature. However, passivation left on the surface after etch becomes a highly fluorinated and inert residue that is similar to polytetrafluoroethylene (PTFE). Failure to completely remove this residue from the device can cause device performance problems and create reliability issues, lowering the die yield and increasing the cost. Proper cleaning allows for maximized performance.

Considerations
The global regulatory landscape reveals a patchwork approach to addressing environmental, health, and safety (EHS) concerns, which can impact cleaning choices. Companies must think about existing as well as emerging compliance issues. The trend points toward tighter restrictions on cleaning solutions that contain chemicals with a less friendly EHS profile.

Useful tips and recommendations
Dynaloy recommends manufacturers take the time to understand their residue. Evaluate whether your analytical techniques are sufficient to show whether the surface is truly clean. Let Dynaloy help you determine whether you are achieving the level of clean that is necessary to supply your customers with reliable products.

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<th>Product</th>
<th>High performing</th>
<th>TMAH free</th>
<th>NMP free</th>
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<tr>
<td>Dynastrip™ 9150</td>
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<td>Dynastrip AP7880 series</td>
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<tr>
<td>Dynastrip DL7790</td>
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