Raytheon:

Raytheon Company is a major manufacturer of defense and civilian technology products in the areas of command, control, communications and intelligence systems.

Raytheon has wafer fabrication operations at their Andover, Massachusetts and Goleta, California facilities. At their Andover, Massachusetts facility, nearly 22,000 pounds of 1-methyl-2-pyrrolidone (NMP) and over 41,000 pounds of acetone were used in 2012. The NMP is primarily used for stripping operations for their semiconductor wafers, and the acetone was primarily used for subsequent wafer cleaning operations.

The most common semiconductor materials used as substrates in Raytheon's wafer operations include:

1. Gallium nitride (GaN)
2. Gallium arsenide (GaAs)
3. Silicon

The most common materials that need to be stripped and cleaned from the substrate materials include:

1. Shipley Microposit 1800 series positive photoresist that contains electronic grade propylene glycol monomethyl ether acetate (CAS #108-65-6) and mixed cresol novolak resin.
2. Polymethyl methacrylate (PMMA) used for positive resist for direct write electron beam.

In addition, each wafer has a variety of different materials introduced to the base substrate as growth layers. The complexities and high reliability requirements of their products introduce strict performance criteria that must be met by the stripping and cleaning chemicals used.

Raytheon is seeking assistance from UMass faculty to conduct research on alternative chemicals to NMP and acetone for use in their semiconductor wafer stripping and cleaning operations. This research would include the identification of potential safer solvents or solvent blends, and the in-depth evaluation of these materials. The alternative materials need to be safer from an environmental, health, and safety standpoint, as well as provide equivalent or better technical performance than NMP and acetone. The results of this research will be of value to other electronics companies also using NMP and acetone in similar wafer fabrication operations.

For further information about the research needs for this project, please contact Ken Meserve at: Kenneth_Meserve@raytheon.com