



AN 182

Cleanroom Materials as Sources of Airborne Molecular Contamination

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Discussion

Every material introduced into a cleanroom is a potential source of Airborne Molecular Contamination (AMC). The chemical composition of a material, its surface area and its temperature ultimately determine the levels of contamination introduced into the cleanroom environment. Those contaminants that condense on critical process components can lead to “AMC defects” such as changes in the electrical properties of wafers, uncontrolled boron and phosphorus doping, etch rate shifts, threshold voltage shifts, wafer and stepper optics hazing and high contact resistance. As line widths of microelectronic devices shrink “AMC defects” have become a major concern and will need to be considered in the design of future cleanrooms.

The condensable Airborne Molecular Contamination arising from various cleanroom materials has been studied by means of FTIR, GC/MS and TOF-SIMS. In addition, the transfer of contaminants by direct contact was analyzed. The latter is of interest since contact transfer may result in the spread of contaminants over a large area of the cleanroom. In both experiments silicon wafers were used as substrate material. Table 1 summarizes the results for different parts of a cleanroom chair and from 3 different cleanroom gloves. The letter indicates the technique by which a contaminant was detected, the color of the letter indicates whether a contaminant was detected as condensable AMC (black) or by contact transfer on a wafer (red). Due to its high sensitivity for most condensable AMCs, TOF-SIMS detects a significantly larger number of contaminants than GC/MS or FTIR. TOF-SIMS also allows for detection of contaminants transferred by contact. The ability to identify specific contaminants with high sensitivity is of critical importance to meet requirements for future contamination control and for an optimized selection of cleanroom materials.

Contaminants	Cleanroom Chair				Cleanroom Gloves		
	Seat Bottom	Foam Seat	Seat Cover	Wheel	Glove A	Glove B	Glove C
Plasticizer: phthalates, adipate	TF	F				T	
Antioxidants: BHT etc.						T	G
Fatty Acid Amides			TT			T	T
Alcohol Amines, other C _x H _y NO	T		T	T	TT	F	
Fatty Acides					T		TT
Other Organic Acids							F
Amines		TTFG	TT		FT	TFT	T
Esters							F
Sulfates, Sulfonates, etc.						T	T
Triphenyl-phosphate	TTF	G	TTFG				
Silicones	T			T	T	T	TTF
Aromatic C _x H _y O _z							T
High Molecular C _x H _y							F
Fluorocarbons					T		

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