High Sensitive SQUID Detection System for Metallic Contaminant in Food or Beverage

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A PC controlled high sensitivevfood contaminant detector was designed and constructed. There is a possibility that individuals ingest contaminants that have been accidentally mixed with food because processed foods have become very common. Therefore a detection method of small contaminants in food and pharmaceuticals is required. The system we have developed is the High-T_c SQUID based system, which is covered with waterproof stainless steel plates and acceptable to HACCP (Hazard Analysis Critical Control Point) program. The outer dimension of the system is 1510 mmL x 215 mmW x 870 mmH and an acceptable object size is 200mmW x 80mmH. An automatic liquid nitrogen filling system was installed in the standard model. This system employed double layered permeable metals with thickness of 1mm as a magnetically shielded box. The distribution of the magnetic field in the box was simulated by FEM (Maxwell, Ansoft Corporation); the gap between each shield layer was optimized before fabrication. Then the shielding factor of 1/730, which is good enough to operate the system in a factory was achieved in z-component. As a result, we robustly detected a steel ball as small as 0.3 mm in diameter with distance of 80 mm above the object. There is also a strong demand for detection of metallic contaminants in minced flesh or juice with pulp because a strainer cannot be applied to such a pulpy liquid. We are developing the detection system based on high-T_c SQUID for a beverage. The detail of the system will be also discussed.

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