

MICROSCOPE-BASED ONLINE PARTICLE MONITORING

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Beyond concentration, health effects of airborne particles depend on their size distribution and composition. One possible approach providing this information is single particle analysis either by electron (SEM) or light microscopy (LM). LM is favored due to optical information from the particle interior, while SEM provides surface information only. By employing image analysis, light microscopy has been developed towards an objective measuring technique. The feasibility of an automated particle classification was demonstrated by a novel pattern recognition technique. A recognition rate of about 95% was achieved for 26 of the most frequent pollen species in Central Europe and 97,4% for 6 allergic pollen out of this group, without using any pollen-specific code. These results gave reason to a research project aiming at the development of a fully automated microscopic online-particle monitor. The instrument will combine high-volume sampling, pre-concentration of particles >2.5 µm, electrostatic precipitation suitable for optical analysis, imaging by translucent, fluorescence, dark field and polarisation microscopy, feature extraction by gray scale invariants and classification by Support Vector Machines. A first demonstrator will be provided at the end of 2004. The field tests are planned for 2005. A commercial device should be available after 2006. The project is funded by the German Ministry of Education and Research.