Twenty-seven people, who normally are not in contact with firearms, were sampled, as were 70 crime scene investigators, who had visited SKL at different occasions. Samples were also collected from surfaces where p-GSR investigations take place at SKL, and from seats in 17 police cars.
- Shaking hands—a possible source of contamination?
- How long does the p-GSR stay on the hand?
- Where on the hand is the p-GSR found?
- Five different types of firearms were investigated to determine how much p-GSR transfer to the hand by handling a not recently used firearm, by shooting, and by handling a recently used firearm.

The collected samples were investigated for p-GSR by means of a scanning electron microscope equipped with an energy-dispersive x-ray detector (SEM/EDX). Results of this study showed that it is possible to get a few p-GSR from contamination. No p-GSR was found on persons who normally do not handle firearms. The amount of p-GSR on the shooter's hands proved to depend on the type of the firearm. It was also found that the p-GSR disappears from the shooter's hands within approximately 3 h.

Gunshot residue questionnaire evaluation

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A questionnaire survey was conducted by the firearms working group of the European Network of Forensic Science Institutes (ENFSI) in 2003. The purpose of this survey was to gather information about the gunshot residue (GSR) analysis in order to coordinate GSR analytical practices and interpretation across European forensic laboratories. The questionnaire included aspects of accreditation, standard procedures for GSR analysis, instrumentation by scanning electron microscopy/energy-dispersive x-ray, interpretation of the results, wording of GSR statement, and so forth. In all, 52 forensic laboratories from 22 countries responded to the questionnaire, with a response rate up to 90%. The results show that there is an urgent need for mutual acceptance of classification and interpretation of GSR particles and common criteria for evaluating GSR based on the number of GSR particles found in the sample.

Advances in Theory, Instrumentation, Semiconductor, and Materials Applications of Scanning Microscopy

Low-temperature scanning electron microscopy of snow crystal metamorphism in winter snow covers

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Seasonal snow cover results from the precipitation and accumulation of highly complex snow crystals. With passing time and continued accretion, these crystals are subjected to internal pressures as well as local climatic factors, such as sun exposure, temperature variability, precipitation rates, and wind history, that result in gradual, complex changes or metamorphoses of the snow crystals.[1] Various forms of metamorphism may occur and the specific types of crystals that result may influence avalanche potential, the radiative properties of the snow cover, and the interactions between the snow, soils, and vegetation.[2] For these reasons, visualizing and understanding snow crystal metamorphism in snow cover is an important endeavor.

The common procedure used to visualize snow crystals in snow cover consists of digging a snow pit and then using a hand lens in the field to examine the individual crystals that are systematically collected from the wall of the pit. Based largely on this procedure, Sturm *et al.*[1] suggest that worldwide snow covers can be grouped into six classes—tundra, taiga, alpine, maritime, prairie, and ephemeral—which correspond to specific climatic regimes. Each class has unique textural and stratiographic features, including snow crystal morphology. However, studies of the structural features of crystal morphology within these classes is somewhat limited by the light optics that are used in the field to characterize the snow crystals.

Within the past decade, low-temperature scanning electron microscopy (LTSEM) has provided a new and powerful technique for examining snow and ice.[3] With this technique, the authors have shown that samples can be easily collected in the field and shipped to a laboratory by common air carrier from distances as far as 8,000 km. In the current study, LTSEM is used to describe and compare the

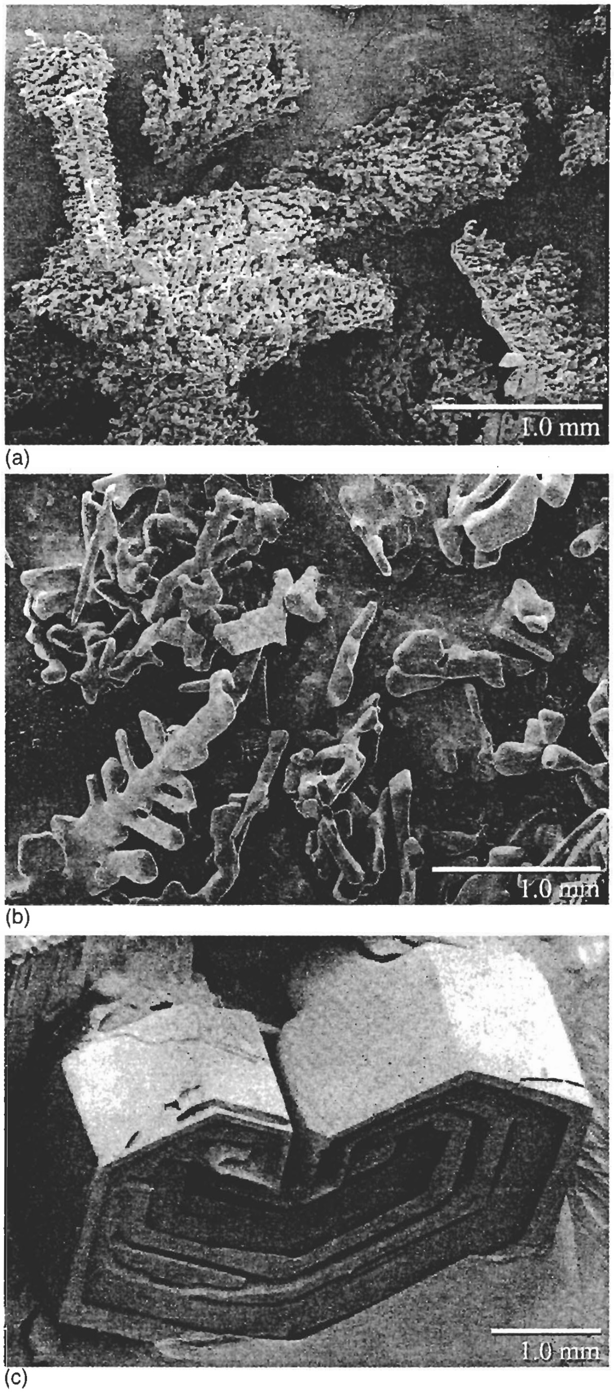

FIG. 1 (a) Fresh graupel particles consisting of snow crystals that are heavily encumbered with frozen cloud droplets. Sample obtained on the surface of a taiga snow cover, (b) Crystals from samples below the surface of the pits lost their sharp edges, became rounded and joined or sintered, (c) Near the bottom of the pits, large, loosely sintered depth hoar crystals were found. These crystals were commonly 2 to 3 mm in length and had flat outer faces with sharply defined angles.

structures of metamorphosed snow crystals in three classes of seasonal snow covers, namely prairie, taiga, and alpine.

Snow crystals were collected from a pit at 10 cm intervals by using a precooled (LN_2) scalpel to dislodge gently the crystals from the pit wall onto a copper plate containing a thin layer of cryoadhesive. Immediately after a specimen was collected, the plate containing the adhesive and the sample was plunged into a vessel of LN_2. In all subsequent procedures, including shipping, storing, coating, observing, and photographing, the plates containing the samples were maintained in Dewars or on stages at temperatures ranging from −110° to −196°C.

Surface samples from each site consisted of newly fallen dendrites or graupel, crystals that were heavily encumbered with frozen cloud droplets (Fig. 1a). In the upper layers, the dendritic crystals had well-defined edges that could be clearly observed. Crystals from samples below the surface of the pits, lost their sharp edges, became rounded and joined or sintered (Fig. 1b). Near the bottom of the pits, large loosely sintered depth hoar crystals were found. These crystals were commonly 2 to 3 mm in length and had flat outer faces with sharply defined angles (Fig. 1c). They frequently exhibited internal stepped depressions that gave them the cup-like appearance previously described for depth hoar.

Based on these observations, LTSEM appears to be a valuable technique for characterizing snow crystal metamorphosis in snow covers and will help us to understand how environmental and physical factors influence these changes.

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Fractal analysis applied to microscopic studies of ice crystals of a model solution

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In this work, fractal analysis of time-related ice crystal changes in a food and ice slurries model solution is presented. Results show the fractal character of the perimeter of ice crystals and a decrease of the fractal dimension with increasing storage time, in accordance with the well-known perception of increase in smoothness.