

# Urban Radiological Accident Mapping Using Smartphones Equipped with Personal Radiation Dosimeter

Nuclear safety and nuclear security are two subjects that they should be considered in the field of nuclear science and nuclear technology. Radionuclides can be released to the environment due to unforeseen accidents and incidents. The releasing of radionuclides decreases the level of safety and security of states. Radiological contaminations may happen during nuclear and/or radiological accident in nuclear facilities or from materials out of regulatory controls. Hence, contaminated regions in urban and suburban may have resulted from nuclear and/or radiological accidents. These regions can lead to the expose of members of the public to ionizing radiation resulting in negative health effects in the exposed population. According to the life-saving strategy during emergencies, it is necessary to characterize the contaminated region on map within 2-3 hours after starting accident, especially in the regions that there is high level of population. Environmental assessment during radiological accident need large amount of data. In order to investigate, control and regulate a contaminated region the possibility to perform screening surveys of the contaminated region using in-situ techniques is an important alternative allowing to improve the safety of people and to reduce the costs of the contamination survey using traditional instruments. In this research improvement of national nuclear safety and nuclear security using personal Smartphone that equipped with dosimeter during nuclear or radiological accident is considered.

## METHODOLOGY

New generation of personal radiation dosimeters that can be attached to Smartphone has been developed by manufactures. It is possible that the national nuclear emergency centers provide radiological contamination map using personal Smartphones and national Wireless Communication System and/or WiFi (Fig.1).

Fig. 1 Images of some commercial radiation dosimeter attachable to smartphones.

## RESULTS

During the radiological accident in urban and suburban, nuclear emergency center need complete information about the contaminated region, movement and transformation of radiological contamination. The evacuation criteria after a nuclear or radiological accident needs a vital decision that involving risk-benefit should be done by decision makers to make a decision within hours. For the procedure of evacuation, the geographical direction and the radiological map of region is essential. To have a trustable radiological map, the environmental monitoring must be done with high efficiency and fast techniques. Due to development of technology, application of many kinds of techniques in environmental monitoring has increased during the last years.

The first step of radiation mapping in a region is choosing the proper radiation detectors. Before selecting an instrument, it is important to understand both the activity concentration values that are to be verified, the capabilities of the monitoring instruments and the characteristics of the potentially contaminated material. Some types of instruments are quite expensive, a factor that may limits their availability for radiological mapping. For the measurement strategies one should determine the most likely affected environmental compartments and probable migration pathways. Such specifics have to be taken into account to make a proper selection of the devices needed to investigate the contaminants of concern by performing in situ measurements.

Now a days, some manufacturers have produced several kinds of personal dosimeters that can be attached to the Smartphone. The Smartphone are used in all countries and near the all of people have their own Smartphone. Hence, it is possible for people to have a personal dosimeter that attached to their Smartphone for their lifetime. Handling of personal dosimeter by people have many advantages. In this research we would like to study the application of personal dosimeter during urban and suburban nuclear or radiological accident. The software or app. that installed in the Smartphone can manage the attached dosimeter. The Smartphone can present the radiation dose rate and the accumulated radiation dose using Wireless Communication System. If the received radiation dose rate is more than background radiation, the Smartphone can give an adequate alarm to aware the owner of the Smartphone.

The online Smartphone can send two significant data to the national nuclear emergency control center using Wireless Communication Systems. The first is the geographical position and the second is radiation dose rate of related geographical position interally. Using the received date from each Smartphone, the data collection system can provide online radiation map of region and present to decision makers.

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