

# Development of an active radon mitigation by a high sensitive radon detector and a ventilation system

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Recently, Radon ( $^{222}\text{Rn}$ ) and Thoron ( $^{220}\text{Rn}$ ) are one of top issue in Republic of Korea, since the mattresses from domestic manufactures release the radon at levels that exceed safety standards, which is 1 mSv per year for the radiation dose of the general public by processed products. Radon emanation, additional, found in a natural latex, a mask, a sanitary pad, a health care instrument, construction materials and so on. Most types of the radon mitigation use the ventilation the inner gases. This method causes some loss of the heated or air conditioned air, which increase the operation cost of the system. Korea Research Institute of Standards and Science (KRIS) is developing a new concept of an active radon reduction system by an interworking technology with a high sensitive radon monitor system and a ventilation system. The sensitivity of the commercial radon detector with the  $^{222}\text{Rn}$  activity measurement is up to 13 cpm/(kBq/m<sup>3</sup>). This system employs an electrostatic radon detection method and it counts an alpha emitting from the radon daughters, such as  $^{218}\text{Po}$ ,  $^{214}\text{Po}$ ,  $^{216}\text{Po}$  and  $^{212}\text{Po}$ . The activity of  $^{222}\text{Rn}$  and  $^{220}\text{Rn}$  can be identified by a good energy resolution of the alpha detector. However, it needs a time delay due to the secular equilibrium between  $^{222}\text{Rn}$  and  $^{218}\text{Po}/^{214}\text{Po}$ . By considering the fast response of the radon concentration in house, a higher sensitivity of radon detector is essential. KRIS is developing a high sensitive radon detector by the electrostatic radon detection method. The design of the radon collection cell is import to collect the daughter nuclei from  $^{222}\text{Rn}$  and  $^{220}\text{Rn}$ . It has been optimized by the 2D and 3D electric field calculation by finite element method. Additional, the mock-up model of the radon collection cell has been fabricated by the 3D printer and the detection efficiency has been compared with different design. Fig. 1 shows the mock-up design of radon collection cell and the comparison with the commercial radon detector (RAD7). The efficiency of designed sell shows 1.35 times higher than that of RAD7. In this presentation, the new radon mitigation system and the high sensitive radon detector will be discussed.

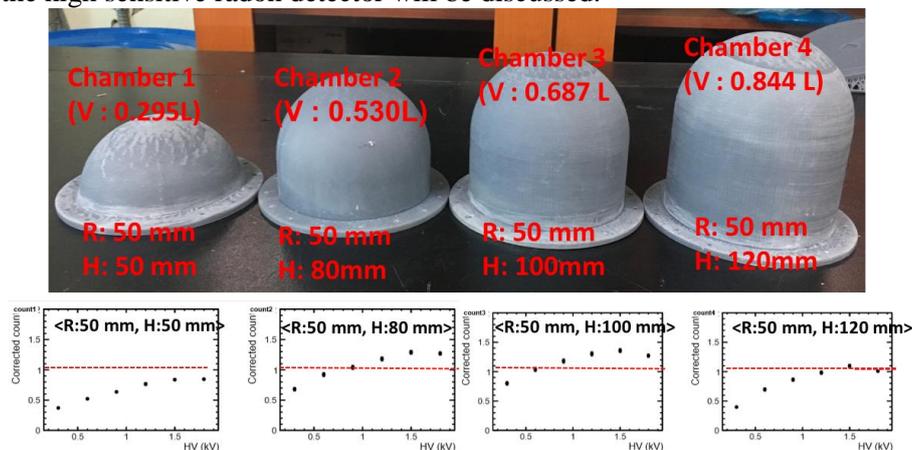


Fig. 1. Radon decay chambers (top) and the relative sensitivity to RAD7 (bottom)

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