SOURCE APPORTIONMENT OF PM_{10} PERSONAL EXPOSURE OF AN ELDERLY POPULATION IN ONE COMMUNITY, TIANJIN

Nan Zhang, *State Environmental Protection Key Laboratory of Urban Ambient Air Particulate Matter Pollution Prevention and Control, College of Environmental Sciences and Engineering, Nankai University, China.*

Zhipeng Bai, *State Environmental Protection Key Laboratory of Urban Ambient Air Particulate Matter Pollution Prevention and Control, College of Environmental Sciences and Engineering, Nankai University, China.*

Background and Aims: Studies on personal exposure were in need to better understand and analyze source apportionment of PM_{10} personal exposure, especially for the elderly. The object of this study was to collect personal exposure samples to PM_{10} of the elderly livings in one community in Tianjin and to identify their potential personal exposure sources.

Methods: In this study, a total of 80 elderly participants were selected and monitored in August and September, 2009. 24-h average particulate matter personal exposure and simultaneously compared with residential indoor and outdoor PM_{10} concentrations were measured in Tianjin, China, together with 24-h time-activity patterns collected. Ratio method and PCA receptor model were implied to analyze related sources and contributions.

Results: Using ratio method, it was found that the ratio of OC and EC were more than 2, and the NO_3^-/SO_4^{2-} ratio were relatively lower, besides, PM_{10} indoor exposure contributed more to PM_{10} personal exposure than PM_{10} outdoor exposure. PCA receptor model showed that seven sources were resolved, namely metal smelting, motor vehicle emission and nitrate, combustion, soil, industrial sources (mainly steel-making), second sulfate and indoor re-suspended particulate matter.

Conclusions: The second organic pollution may be existed to personal exposure. The stationary emissions were a dominant source of PM_{10} personal exposure. Metal smelting, motor vehicle emission and nitrate, combustion were identified as principal sources of personal exposure to PM_{10}.

References:

Brinkman G L, Milford J B, James J S, et al .Source Identification of Personal Exposure to Fine Particulate Matter Using Organic Tracers. Atmospheric Environment, 2009;43:1972-1981.

Judith C. Chow, John G. Watson, LU Zhiqiang, et al. Descriptive Analysis of $PM_{2.5}$ and PM_{10} At Regionally Representative Locations During SJVAQAS/ AUSPEX. Atmospheric Environment, 1996;30:2079-2122.

Turpin B J, Huntzicker J J. Identification of Secondary Organic Aerosol Episodes and Quantitation of Primary and Secondary Organic Aerosol Concentrations During SCAQS. Atmospheric Environment, 1995;29:3527-3544.

Junji C, Zhenxing S, Judith C. Chow, et al. Seasonal Variations and Sources of Mass and Chemical Composition for PM_{10} Aerosol in Hangzhou, China. Particuology, 2009;7:61-168.

Hopke PK, Ramadan Z, and Patero P. Receptor Modeling of Ambient and Personal Exposure Samples:1998 Baltimore Particulate Matter Epidemiology-exposure Study. Atmospheric Environment, 2003;37:3289-3302.