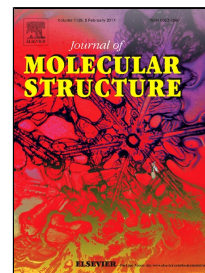


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# Analysis of degraded papers by infrared and Raman spectroscopy for forensic purposes

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## Abstract

Paper being the basis of different documents is often the subject of forensic examination. Growing number of bogus or in other manner fraudulently alternated documents causes necessity of identification of individual paper sheets and discrimination between sheets being the parts of analyzed questioned document. Frequently it is necessary to distinguish between paper of the same type but of a different age. Thus, it is essential to know whether the degradation process of paper influences the possibility of differentiation between paper samples.

Samples of five types of office paper from different manufacturers were artificially aged in a climatic chamber under 65 % relative humidity in air at 90°C for various periods of time up to 35 days. The conditioned samples were examined by the use of infrared and Raman spectroscopy. Three cards of each paper type were chosen for the experiment. Three different spots on each paper card were measured to assure reproducibility of the experiment in both spectroscopic methods. The possibility of differentiation between aged samples was evaluated. The 2D correlation analysis based on the Noda's method was carried out using ATR FTIR spectra as an input data for generating the correlation maps. It was found that pattern of 2D maps allow to distinguish tested paper samples, identified its components and get insight into paper degradation mechanism.

**Keywords:** paper ageing, vibrational spectroscopy, 2D correlation

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