"Fe(II) Spin Crossover Coordination Complexes: A Novel Potential Alternative of Temperature Sensors in Food Packaging Industry"

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ABSTRACT

It is a fact that food quality and subsequent consumers' health safety are considered as issues of great importance. One of the main concerns of food industries is the development of new "smart" food packaging materials, which exhibit useful features, e.g. sensor-type properties. One of the main characteristics of Spin Crossover (SCO) complexes, is that they show temperature-dependent drastic colour changes accompanied by spin state conversion.[1] In the present research activity, low nuclearity Fe(II) SCO coordination complexes have been investigated in depth as potential sensors in refrigerated food packaging materials. Furthermore, for practical application reasons the examination of the sensors' behaviour after their incorporation into conventional polymers could be also referred to as an important part of such a research.[2]

The coordination complexes developed were characterized with various methods/techniques, like Raman, ATR, p-XRD, UV/VIS, SEM. Temperature-dependent and low-frequency Raman experiments played a significant role for the meticulous examination of the SCO phenomenon. In addition, the SCO behaviour after the incorporation of the sensors into conventional food packaging polymer matrices (PLA, PS) was correlated with the corresponding one of the bulk material. In parallel, the potential migration release of the sensors into food simulants was also tested (based on EU regulations [3]).

REFERENCES

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[3] Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food: "Testing for 10 days at 40 °C shall cover all storage times at refrigerated and frozen conditions including heating up to 70 °C for up to 2 hours, or heating up to 100 °C for up to 15 minutes."