

# ISO/TS 21975:2020 (E)

## Nanotechnologies — Polymeric nanocomposite films for food packaging with barrier properties — Specification of characteristics and measurement methods

---

### Contents

	Foreword
	Introduction
1	Scope
2	Normative references
3	Terms, definitions and abbreviated terms
3.1	Terms and definitions
3.2	Abbreviated terms
4	Essential and optional characteristics to be measured and their measurement methods
4.1	General
4.2	Nano-object (essential characteristics)
4.2.1	Size and size distribution
4.2.1.1	General
4.2.1.2	Small angle X-ray spectroscopy
4.2.1.3	Electron microscopy
4.2.1.4	Particle tracking analysis
4.2.1.5	Dynamic light scattering
4.2.1.6	Atomic force microscopy
4.2.1.7	Laser diffraction
4.2.2	Chemical composition content
4.2.2.1	General
4.2.2.2	X-ray diffraction
4.2.2.3	X-ray fluorescence analysis
4.2.2.4	Energy dispersive X-ray analysis
4.2.2.5	Inductively coupled plasma
4.3	Nanocomposite (essential characteristics)
4.3.1	Total luminous transmittance
4.3.2	Ash content
4.3.3	Barrier properties
4.3.3.1	General
4.3.3.2	Oxygen transmission rate
4.3.3.3	Water vapour transmission rate
4.3.3.4	UV-Vis transmittance
4.4	Nano-object (optional characteristic)
4.4.1	Colour of nano-object raw material
4.4.2	Morphology
4.5	Nanocomposite (optional characteristic)
4.5.1	Appearance of nanocomposite
4.5.1.1	General
4.5.1.2	Colour
4.5.1.3	Haze of a nanocomposite film
4.5.2	Mechanical properties
4.5.3	Physical properties
4.5.3.1	Melting temperature
4.5.3.2	Glass transition temperature
5	Preparation of test specimens

**6 Reporting**

- 6.1 General**
- 6.2 General information**
- 6.3 Measurement results**
- 6.3.1 Essential characteristics**
- 6.3.2 Additional information**
- 6.4 Example of table format**

**Annex A (informative) Shelf life extension of food**

- A.1 General**
- A.2 Protection from oxygen**
- A.3 Protection from ethylene**
- A.4 Control of CO<sub>2</sub> level**
- A.5 Moisture level**
- A.6 Light protection**

**Annex B (informative) Barrier properties improvement via nano-object incorporation into polymeric film**

**Annex C (informative) Effect of processing parameters on barrier properties**

**Annex D (informative) Polymer characteristics affecting barrier properties**

- D.1 Crystalline phase type and crystallinity**
- D.2 Morphology**

**Page count: 19**