

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)**

To: see form PCT/ISA/220

Date of mailing (day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference see form PCT/ISA/220	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/EP2019/083442	International filing date (day/month/year) 03.12.2019	Priority date (day/month/year) 03.12.2018
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International Patent Classification (IPC) or both national classification and IPC INV. C08J9/00 C08J9/08 C08K3/22 C08K5/098 C08L25/08 ADD. C08F212/08
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Applicant TRINSEO EUROPE GMBH

1. This opinion contains indications relating to the following items:


- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer Rodríguez, Luis Telephone No. +31 70 340-0
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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>3, 6, 9, 10, 15</u>
	No: Claims	<u>1, 2, 4, 5, 7, 8, 11-14</u>
Inventive step (IS)	Yes: Claims	<u>6, 10</u>
	No: Claims	<u>1-5, 7-9, 11-15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1). Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure:

D1 EP 2 267 065 A1 (TOTAL PETROCHEMICALS RES FELUY [BE]) 29
 December 2010 (2010-12-29)

D2 US 3 322 734 A (WATKIN REES RICHARD) 30 May 1967 (1967-05-30)

D3 US 2009/275716 A1 (REIMERS JAY [US] ET AL) 5 November 2009
 (2009-11-05)

The most relevant passages of these documents are identified in the European Search Report.

2). D1 describes expandable compositions comprising a copolymer of styrene and zinc diacrylate or zinc dimethacrylate, a blowing agent and a filler.

The copolymer forms reversible crosslinks over the zinc cations.

The disclosure of D1 is novelty-destroying for the subject-matter of present claims 1, 2, 4, 5, 7, 8 and 11 to 14 (Art. 33(2) PCT).

3). D2 describes styrene copolymers with maleic or methacrylic acid crosslinked with magnesium or zinc acetate and foams thereof.

The disclosure of D2 is novelty-destroying for the subject-matter of present claims 1, 2, 4, 5, 7, 8 and 11 to 14 (Art. 33(2) PCT).

4). D3 describes polystyrene resins modified with a small amount of zinc methacrylate and foamed articles obtained therefrom.

The disclosure of D3 is novelty-destroying for the subject-matter of present claims 1, 2, 4, 5, 13 and 14 (Art. 33(2) PCT).

5). The subject-matter of present claims 3, 6, 9, 10 and 15 has been found to be novel (Art. 33(2) PCT).

6). D1 may represent the closest prior art to the subject-matter of claims 3, 6, 9, 10 and 15.

6.1). The subject-matter of present claim 3 differs from D1 in that the three main elements of the composition, polymer, metal source and blowing agent, are provided as separate parts that are brought into contact when forming the foam.

It is standard practice in the art to add e.g. the blowing agent to the polymer to be foamed only when this has already been molten in an extruder.

The subject-matter of present claim 3 does not involve an inventive step over D1 in view of the common general knowledge of the skilled practitioner in the art (Art. 33(3) PCT).

6.2). D1 discloses e.g. at § [0008] that the ionic reversible crosslinks introduced through the modification of the polystyrene with zinc dimethacrylate or similar monomers has as an effect that the polymer behaves at low temperature as if it had a high molecular weight, i.e. it has high viscosity, whereas it shows the behaviour typical for a low molecular weight polymer, i.e. low viscosity, at high temperatures.

D1 does not disclose how big the change in viscosity is between the crosslinked (low temperature) and uncrosslinked (high temperature) forms, but it makes clear that this difference can be tailored by providing the necessary amount of crosslinking sites in the form of copolymerised methacrylic acid units.

The subject-matter of present claims 9 and 15 does not involve an inventive step over D1 taken alone (Art. 33(3) PCT).

6.3). The available prior art does not suggest that the crosslinking salt could at the same time serve as a blowing agent. An inventive step could be acknowledged for the subject-matter of present claims 6 and 10 (Art. 33(3) PCT).

Re Item VII

Certain defects in the international application

1). At least D1 should be acknowledged in the description (Rule 5.1(a)(ii) PCT)

Re Item VIII

Certain observations on the international application

- 1). The use of the term "about" when defining ranges in the claims introduces uncertainty, since it blurs the limits of these ranges. It is thus contrary to Article 6 PCT. Claims 1, 8 and 13 are not clear for this reason.

- 2). A metalloid is not generally recognized as a metal, but as a sort of intermediate element between metals and nonmetals with characteristics of these two classes of compounds. Claim 4, that lists metalloids as metals, is in contradiction with claim 1 and renders claim 1 not clear (Art. 6 PCT).

- 3). Claim 11 mentions as different categories metal stearates and metal acetates on the one hand and metal carboxylates on the other hand, whereas the second category encompasses the first. On top of that, a metal hydroxide is neither a salt nor an oxide. Claim 11 is not clear (Art. 6 PCT).