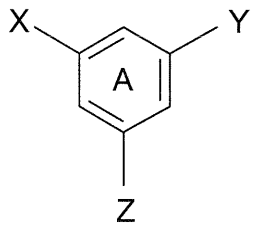
The problem is solved by a composition comprising an at least essentially amorphous polymer and a nucleating agent of formula (1).

In one aspect, the ~~The subject of the~~ present ~~invention~~ disclosure ~~is~~ provides a composition for the preparation of a polymeric foam, and in particular a masterbatch composition, comprising

(i) an at least essentially amorphous polymer resin selected from the group consisting of poly(methyl methacrylate) (PMMA), polyvinyl chloride (PVC), polystyrene (PS), polystyrene copolymers, polycarbonate (PC), polysulfone, poly(ether sulfone) (PES), poly(p-phenylene ether) (PPE), polyethylene terephthalate glycol-modified (PETG), and mixtures or blends thereof;

(ii) a nucleating agent of formula (1)



(1)

wherein
X, Y, and Z independently of each other denote –CONHR or –NHCOR, wherein each R independently is selected from the group consisting of iso-propyl, tert-butyl, 3-pentyl, neopentyl, iso-pentyl, phenyl, 4-methylphenyl, 3,4-dimethylphenyl, 3,5-dimethylphenyl, cyclopentyl, cyclohexyl, and 1-adamantyl,
and wherein the three free positions in the benzene ring A are unsubstituted or are substituted with methyl.

In another aspect, the present disclosure provides a foamed polymeric article comprising (i) 80 % to 98.99 % by weight of an at least essentially amorphous polymer, (ii) 0.01 % to 0.5 % by weight of a nucleating agent of formula (1), (iii) 1

to 10 % by weight of a non-hydrocarbon and/or organic blowing agent and (iv) 0 to 18.99 % by weight of further additives, wherein (i) and (ii) are as defined herein.

In a further aspect, the present disclosure provides a method for preparing a foamed polymeric article as disclosed herein, comprising the steps of

a) adding a nucleating agent of formula (1)
and optionally further additives, preferably a chemical blowing agent, flame retardant, inorganic nucleating agent, cell stabilizer, plasticizer, and/or colorant
to an at least essentially amorphous polymer to obtain a polymer composition;

(b) melting the polymer composition obtained in step (a) to obtain a polymer melt; and

(c) extruding the polymer melt of step (b) in an extruder in the presence of a blowing agent;

(d) cooling the polymer melt and forming a foamed polymeric article.

In yet another aspect, the present disclosure provides a method for preparing a foamed polymeric article as disclosed herein, comprising the steps of

(a) pre-mixing the nucleating agent of formula (1) and optionally the further additives with an at least essentially amorphous polymer resin to obtain a polymer composition;

(b) heating the polymer composition obtained in step (a) to a temperature above the melting temperature of the polymer to obtain a polymer melt;

(c) adding a non-hydrocarbon blowing agent and/or one or more organic blowing agents to the polymer melt;

(d) homogenizing the mixture obtained in step (c) and dissolving the non-hydrocarbon blowing agent and/or the one or more organic blowing agents in the polymer melt; and

(e) extruding the homogenized mixture and cooling it in an extruder to form a foamed polymeric article by a pressure drop to ambient pressure or sub-ambient pressure at the extrusion die.

In another aspect, the present disclosure provides a use of the foamed polymeric article as disclosed herein as an insulation board, a decorative article, a packaging material for food or electronics, or in automotive parts.

A preferred nucleating agent is selected from the group consisting of a 1,3,5-benzenetricarboxylic acid derivative of formula (I), a 5-amino isophthalic acid derivative of formula (II), a 3,5-diamino benzoic acid derivative of formula (III), a

temperature of from 80 to 330 °C, more preferably of from 130 to 300 °C, even more preferably of from 180 to 295 °C, especially of from 200 to 290 °C.

In another embodiment of the invention the components are added at room temperature to a liquid Masterbatch carrier, typically an oil, and is mixed with this carrier.

The mixing time is preferably of from 5 s to 10 h. The mixing time in the case of continuous mixing is preferably from 5 s to 1 h, more preferably from 10 s to 15 min. The mixing time in the case of batch wise mixing is preferably from 1 min to 10 h, more preferably from 2 min to 8 h, in particular from 2 min to 5 h, especially from 2 min to 1 h, particularly preferably from 2 to 15 min.

In an ~~further aspect~~embodiment, the present invention also refers to a foamed polymeric article comprising (i) 80 % to 98.99 % by weight of an at least essentially amorphous polymer, (ii) 0.01 % to 0.5 % by weight of a nucleating agent of formula (1), (iii) 1 to 10 % by weight of a non-hydrocarbon and/or organic blowing agent and (iv) 0 to 18.99 % by weight of further additives as specified above.

The foamed polymeric article of the present invention is prepared from the composition of the present invention. In particular, all the preferred embodiments described above for the composition also apply to the foamed polymeric article (= polymeric foam).

Preferably, said polymeric foam has a closed cell content of more than 92 %, preferably more than 95% and more preferably more than 97 %, as determined by gas pycnometry (DIN EN ISO 4590). Such a high closed cell content results in a very smooth surface as well as in a very good resistance against water ingress.

The cells in the polymeric foam according to the present invention have an average cell size of less than 100 µm, preferably of less than 80 µm, more preferably of less than 60 µm, even more preferably of less than 50 µm, and most preferably of less than 40 µm. The average cell size is generally derived from