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 Polymer Bulletin

## Polymer Bulletin for update 201010 Blowing Agents

### Record 1 ( [1061244](#) )

Shawbury, iSmithers, 2009, pp.x, 410, ISBN 978-1-84735-411-2, 25cm, 011

#### **HANDBOOK OF THERMOSET RESINS.**

Ratna D

This text of 7 chapters provides a detailed guide and review of thermoset resins. Chapter 1 provides a general introduction to thermoset networks covering curing, gelation, crosslink density, additives, processing, characterisation, thermal analysis, testing and evaluation. Chapter 2 further develops the subject detailing the chemistry, properties and applications of thermosets. Chapter 3 is devoted to epoxy resins, chapters 4 and 5 to toughened thermoset resins and toughened epoxy resins respectively. Finally chapters 6 and 7 cover thermoset composites and nanocomposites. The book is well referenced, indexed and includes a list of abbreviations and acronyms. 976 refs.

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### Record 2 ( [1060993](#) )

TPE Magazine International 2, No.1, March 2010, p.7 ISSN: 1868-8055

#### **FOAMED TPE SUBSTITUTES PU IN STEERING WHEEL PRODUCTION.**

CTS has introduced a range of foamed thermoplastic elastomers, called Tefabloc, for use as substitutes for PU for steering wheel production. The Tefabloc formulations are based on a thermoplastic elastomer matrix foamed with a hybrid expansion system, which is said to offer a fine and perfect dispersion of the cells inside the matrix, and are 100% recyclable.

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### Record 3 ( [1060905](#) )

Journal of Applied Polymer Science 116, No.4, 15th May 2010, p.2359-2365 ISSN: 0021-8995 CODEN: JAPNAB

#### **MEASUREMENT OF THE SOLUBILITY AND DIFFUSIVITY OF BLOWING AGENTS IN POLYSTYRENE.**

Perez-Blanco M; Hammons J R; Danner R P (Pennsylvania,State University)

A pressure decay method at temperatures from 30 to 200 degrees centigrade was used to study the solubility of various gases, including carbon dioxide, isobutane and tetrafluoroethane (TFE) used as blowing agents in polystyrene (PS). Solubility of TFE in styrene-acrylonitrile (SAN) copolymer was also examined. It was found that gas solubility in all cases was well described by Henry's law. TFE and isobutane were seen to have a plasticising effect on the polymers, with diffusivity increasing with pressure. Highest diffusivity and lowest solubility were found with carbon dioxide. 20 refs.

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**Record 4** ( [1060881](#) )

Journal of Applied Polymer Science 116, No.4, 15th May 2010, p.2157-2165 ISSN: 0021-8995 CODEN: JAPNAB

**SYNTHESIS, THERMAL DEGRADATION, AND FLAME RETARDANCE OF NOVEL TRIAZINE RING-CONTAINING MACROMOLECULES FOR INTUMESCENT FLAME RETARDANT POLYPROPYLENE.**

Jinfeng Dai; Bin Li (Harbin, Northeast Forestry University)

Synthesis of two triazine-containing macromolecule for use as charring and foaming agents (CFA1 and CFA2) in an intumescent flame retardant polypropylene is described. These materials were prepared by polycondensation and were characterised by Fourier transform infrared spectroscopy, nuclear magnetic resonance spectroscopy, elemental analysis and thermogravimetric analysis. Composites of the compounds with polypropylene were prepared by extrusion mixing, and were evaluated using thermogravimetric analysis, limiting oxygen index and UL 94 tests, and impact strength measurements. The two macromolecules show good thermal stability and were seen to promote char formation in polypropylene composites. CFA1 showed higher flame retardance than CFA2 but compounds prepared with CFA2 showed the better mechanical properties. 42 refs.

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**Record 5** ( [1060875](#) )

Journal of Applied Polymer Science 116, No.4, 15th May 2010 p.2110-2118 ISSN: 0021-8995 CODEN: JAPNAB

**GRAPHITE CARBON FOAM FILMS PREPARED FROM POROUS POLYIMIDE WITH IN SITU FORMED CATALYTIC NICKEL PARTICLES.**

Yanling Luo; Qingyun Chen; Dan Zhu; Matsuo M (Nara, Women's University)

Nickel oleate was used as a pore forming agent, and as a catalyst for carbonisation, in polyimide composite films. In situ polymerisation of a polyamic acid in the presence of the nickel oleate was carried out, and curing was carried out on solvent cast samples on a glass slide. Pore formation was by phase separation and the subsequent heat treatment during which nickel particles were formed. The nickel particles acted as the catalyst during the carbonisation process, resulting in carbon foam films from which the nickel was removed by pyrolysis. It was shown that pore size could be controlled by making changes to the initial nickel oleate content. Fourier transform infrared spectroscopy, scanning electron microscopy, energy dispersive X-ray analysis, thermogravimetric analysis, wide angle X-ray scattering and nitrogen absorption and desorption experiments were used in the analysis of the various polymers and films. 32 refs.

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**Record 6** ( [1060861](#) )

Journal of Applied Polymer Science 116, No.4, 15th May 2010 p.1994-2004 ISSN: 0021-8995 CODEN: JAPNAB

**PREPARATION OF MICROCELLULAR POLY(ETHYLENE-CO-OCTENE) RUBBER FOAM WITH SUPERCRITICAL CARBON DIOXIDE.**

Wentao Zhai; Siu N Leung; Lilac Wang; Naguib H E; Chul B Park (Toronto, University)

Thermoplastic elastomer ethylene-octene copolymer foams were synthesised in a batch foaming process using supercritical carbon dioxide as blowing agent. Foams were seen to have a uniform cell size and closed cell structure with an unfoamed skin when low foaming temperatures were used. The effects of molecular weight and changes to foaming conditions were investigated with respect to gas diffusion, and foam modulus and melt viscoelastic properties. Gas solubility and diffusion constant reduced with increasing molecular weight whilst matrix modulus and melt viscosity increased. The effects this had on cell size and structure was discussed. Rheometry, melting point measurement and scanning electron microscopy were used in the characterisation of the materials. 45 refs.

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**Record 7** ( [1060763](#) )

Modern Plastics Worldwide 87, No.3, April 2010, p.20 ISSN: 0026-8275

**RESIN CONSUMPTION SLASHED THROUGH FOAMING TECHNOLOGY.**

It is briefly reported that small particles of gas-generating additives infused into the polymer melt during processing can reduce resin requirement by up to 50% and carbon footprint by up to 45%. The additives create a microcellular structure via a chemical reaction that releases a small volume of gas, producing a cellular structure at a size Polyfil claims is unachievable with current chemical foaming agents. This will expand the polymer by up to twice its volume. Ecocell can be used with LDPE, HDPE, copolymer PE, PP homopolymers and copolymers, crystal and impact PS, PVDF, TPOs and TPEs.

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**Record 8** ( [1060591](#) )

Polymer 51, No.2, 2010, p.568-580 ISSN: 0032-3861

**RHEOLOGICAL CONTROL IN FOAMING POLYMERIC MATERIALS: I. AMORPHOUS POLYMERS.**

Ruogu Liao; Wei Yu; Chixing Zhou (Shanghai,Jiao Tong University)

The influence of rheological properties, especially melt strength, on foam structures, such as cell size, cell density and cell size distribution, of amorphous polymer was investigated. The rheology of polystyrene (PS) was controlled by molecular modification with free radical reaction, and PS with long chain branching (LCB) level ranging from 0.15 to 1.6 branching point per 10<sup>4</sup> carbon atom was gotten. The shear and elongational rheology were found to be dependent on the LCB structure, and the strain hardening behaviour of modified samples in transient elongational viscosity confirmed the existence of long branched chain. The effects of chain structure and foaming conditions such as temperature and pressure were studied by the analysis on the foam structures obtained by supercritical CO<sub>2</sub>. The experimental results revealed that increasing LCB level would decrease cell size, make cell size distribution narrower and slightly increase cell density. The effects of chain topology on the foam structures were also investigated by numerical simulation, where Pom-Pom model was used to describe the effect of backbone length and arm length. The dependence of cell size on the arm length was consistently observed in experiments and simulation. It suggested that the arm length had greater influence on the cell radius than the backbone length. Therefore, the relationship among foam structures, rheological properties and molecular structures can be established from both experiments and simulation, which can be used as a guidance to control the foam structure by designing and controlling the molecular structures and the corresponding rheological properties. 37 refs. Copyright (c) 2010 Elsevier Ltd.

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