EAGLE RIDGE 1
March 19, 2002

Mr. Neil Blickman
Federal Trade Commission
600 W. Pennsylvania Ave., N.W.
Washington, D.C. 20580

Petition to Establish a New Generic Subclass

The Dow Chemical Company (Dow), world headquartered in Midland, Michigan, hereby submits this Petition to the Federal Trade Commission (FTC) for the establishment of a new generic subclass *(lastol)* within the existing olefin category.

Dow seeks to establish a generic subclass for its new crosslinked elastic fiber (CEF) for three reasons:

1. Dow CEF fiber has the same general chemical composition as the FTC's established olefin generic fiber category:
   - the fiber-forming substance in CEF is composed of at least 85 percent by weight of ethylene, propylene, or other olefin units.
   - specifically, greater than 98 percent by weight of the fiber-forming substance in CEF is composed of ethylene and other olefin units (e.g., 1-octene).
2. Dow CEF, while having the general chemical composition of olefin, has a unique chemistry, molecular design, and fiber structure which enables distinct, important properties to the consumer:
   - the fiber is elastic with a wide temperature tolerance, enabling comfort stretch garments that can be repeatedly washed, dried, and ironed without loss of stretch and elasticity
3. Dow CEF fiber's distinctive elasticity and temperature tolerance features enable olefin to be considered for new apparel applications beyond the conventional socks and thermal underwear:
   - stretch cotton separates like dresses, shirts, and slacks, are now possible *and* desirable for their comfort stretch and easy-care properties

In short, Dow CEF is an atypical olefin fiber differing significantly – in chemistry, process, and properties – from conventional olefin fiber manufactured for apparel uses today per the FTC's definition. Dow CEF is not a rubber, per the FTC's definition, because the fiber-forming substance in Dow CEF is a polyolefin with low but significant crystallinity versus an amorphous (non-crystalline) polyolefin. And last, Dow CEF is not a spandex, per the FTC's definition, because CEF is not made of polyurethane.

The FTC definitions for olefin fiber[1], rubber fiber[2], and spandex fiber[3] are listed below for reference.

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[1]***Olefin***. *A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85 percent by weight of ethylene, propylene, or other olefin units, except amorphous (noncrystalline) polyolefins qualifying under paragraph (j)(1) of this section.*

[2]***Rubber***. *A manufactured fiber in which the fiber-forming substance is comprised of natural or synthetic rubber, including the following categories:*

(1) A manufactured fiber in which the fiber-forming substance is a hydrocarbon such as natural rubber, polyisoprene, polybutadiene, copolymers of dienes and hydrocarbons, or ***amorphous (noncrystalline) polyolefins.***

(2) A manufactured fiber in which the fiber-forming substance is a copolymer of acrylonitrile and a diene (such as butadiene) composed of not more than 50 percent but at least 10 percent by weight of acrylonitrile units.

The term lastrile may be used as a generic description for fibers falling within this category.

(3) A manufactured fiber in which the fiber-forming substance is a polychloroprene or a copolymer of chloroprene in which at least 35 percent by weight of the fiber-forming substance is composed of chloroprene units.

(emphasis added)

[3]***Spandex.*** *A manufactured fiber in which the fiber-forming substance is a long chain synthetic polymer comprised of at least 85 percent of a segmented polyurethane.*

I Dow Crosslinked Elastic Fiber (CEF): The Atypical Olefin Fiber

A. Properties of Dow CEF Versus Conventional Olefin

1. Unique Chemistry of Dow CEF

Dow CEF is the first manufactured olefin fiber founded on metallocene-based polyolefin elastomer chemistry. Although the fiber-forming substance in Dow CEF is made from olefin monomers, Dow CEF fiber has a unique molecular structure, a unique morphology and unique properties when compared with any olefin fiber previously seen on the market. This unique combination of properties is a direct result of the polymerization chemistry, which includes the use of a constrained geometry catalyst, which is a member of the metallocene family.

This catalyst has a single type of active site allowing precise control of molecular architecture of the polymer. Specifically, greater than 98 percent of the fiber forming substance in Dow CEF is a homogeneously branched ethylene[4] interpolymer[5] composed of ethylene and other olefin comonomer units (typically octene).

Very technically, the polymer in Dow CEF contains short chain branching; has no measurable high-density polymer fraction; has a narrow, essentially single peak in TREF (temperature rising elution fractionation) and differential scanning calorimetry (DSC) profile curve; and has a narrow molecular weight distribution prior to crosslinking. In simple terms, the molecules in Dow CEF are all very similar in size and composition to each other. These molecular characteristics lead to important and distinct fiber properties.

The alpha-olefin comonomer in Dow CEF is typically octene, and is present at a high level (typically in excess of 30 weight percent). This high comonomer content leads to Dow CEF fiber's low but significant level of crystallinity and low density.

In contrast, olefin fiber manufactured today is based on conventional multi-site catalyst technology (such as Ziegler/Natta catalysts). Consequently, it has a broad compositional molecular weight distribution and low or no comonomer content.

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[4]***Homogeneously branched ethylene polymer.*** *Refers to an ethylene interpolymer in which the comonomer is randomly distributed within a given polymer molecule and where substantially all of the polymer molecules have the same ethylene to comonomer molar ratios (WO 99/60060) and are manufactured using so called homogeneous or single site catalyst systems known in the art as metallocene catalyst or constrained geometry catalysts system. (See also US 6,140,442, "Elastic Fibers, Fabrics and Articles Fabricated therefrom" and US 6,194,532, "Elastic Fibers")*

[5]***Interpolymer****. Refers to polymers prepared by the polymerization of at least two different types of monomers, typically ethylene and octene.*

2. Unique Morphology of Dow CEF

As a result of its unique chemical structure, Dow CEF has lower crystallinity than conventional olefin fibers. (See Summary Table 1, page 15.) Specifically, the high comonomer content leads to Dow CEF fiber's low but significant level of crystallinity (12 – 16 weight percent) (Figure 1a, page 5) and low density (from 0.87 to 0.875 g/cc). Unlike conventional olefin fiber where the polymer crystals are in lamellae form, the crystals in the Dow CEF fiber-forming substance are in fringe micelle form. The fringed micellar crystalline morphology[6] and the low but significant level of crystallinity in Dow CEF imparts elastic properties not seen in other olefin fiber manufactured today. This unique morphology of the Dow CEF polymer results in high stretch (such that the fiber can be stretched to at least five times its original length before breaking) and high elasticity or snap back (such that when a fiber is stretched to twice its length and then released, the fiber recovers to within 25% of its original length).

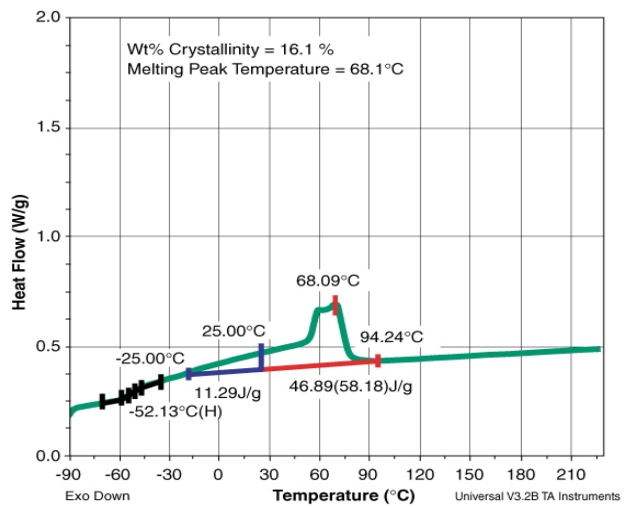
In contrast, conventional olefin fiber, such as drawn polypropylene fiber (Figure 1b, page 5), is highly crystalline with degree of crystallinity greater than 50 percent and density greater than 0.90 g/cc. Additionally, conventional olefin has very low stretch (for example, 33 percent elongation to break) and no significant elasticity at high stretch.

This combination of elasticity, elongation, and mechanical strength found in Dow CEF fiber are not found in conventional olefin fiber manufactured today. *(WO 99/60060, US Patent allowed, but not yet issued.)*

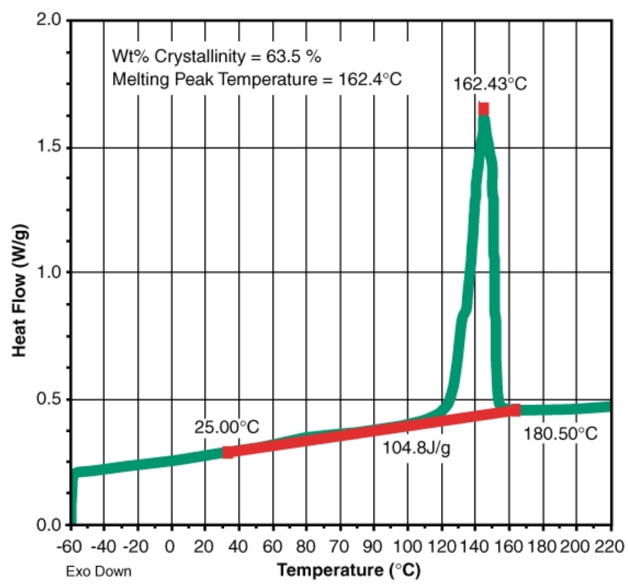
[6] Benedikt, George M., Brian L. Goodall (1998). *Metallocene-Catalyzed Polymers: Materials, Properties, Processing & Markets*. Norwich, New York: Plastics Design Library, pp. 127-133.

Figure 1: Differential scanning calorimetry (DSC) showing crystallinity and melting peak temperature of Dow CEF fiber (a) versus conventional drawn polypropylene fiber (b). Degree of crystallinity is determined from heat of fusion in the melting endotherm.

Dow CEF (a)



Drawn Polypropylene Fiber (b)



3. Unique Manufacturing Process of Dow CEF

Dow CEF fibers are manufactured by melt spinning followed by crosslinking.

Melt spinning

The Dow CEF fiber is fabricated using a melt spinning process. For instance, the polymer may be melt spun into mono-filament or multi-filament fibers with a broad range of deniers (ranging from less than 20 to over 140 denier) on conventional elastic melt spinning equipment, such as that used for thermoplastic urethane fibers. In one specific example, the fibers were separately melt spun on fiber extrusion equipment consisting of an extruder, gear pump and spinneret. The extruder provided a melt temperature of 236°C and each polymer melt stream was fed to the gear pump which pressurized the melt and passed it through a 200 mesh pack followed by a 34 hole spinneret die. The spinneret had a 4:1 L/D and the holes had a diameter of 800 microns. The resin output from the spinneret was controlled at 0.78 gram/hole/minute. The fibers were quenched with a room temperature air high velocity blower.

Crosslinking

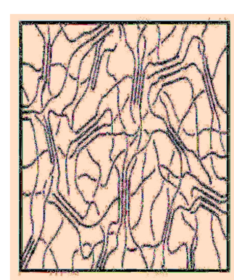
After spinning, the polymer chains in CEF fiber are not connected to one another through covalent bonds. As a result, in an appropriate solvent, such as boiling xylene or tri-chloro benzene, the polymer will dissolve. The fiber will also begin to flow and deform if heated above the crystalline melting point (about 68°C). In order to prevent dissolution and impart high-temperature dimensional stability, the fiber is crosslinked. After the crosslinking process, the polymer chains in the fiber are linked to one another via covalent bonds (Figure 2, below). The crosslinked fiber is characterized as having xylene extractables of less than about 70 weight percent as defined in accordance with ASTM D-2765.

Figure 2: Schematic of morphology of crosslinked Dow CEF fiber (a) versus uncrosslinked polymer (b).

Dow CEF Fiber (a)

Crosslinks and Crystals

Uncrosslinked Fiber (b)



Fringe-Miceller Crystals

The crosslinking process is conducted by any means capable of economically forming covalent links between the polymer chains including electron beam, beta irradiation, gamma irradiation, corona radiation, peroxides, allyl compounds, silane compounds and UV radiation with or without crosslinking catalysts. For example, crosslinking can be accomplished via high energy electron beam irradiation of the fiber spools. The irradiation source can be any electron beam generator operating in a range of 150 kilovolts to 12 megavolts with a power output capable of supplying the desired dosage in megarads. The voltage can be adjusted to appropriate levels. The irradiation is usually carried out at a dosage between 3 to 35 megarads. Irradiation may be carried out at room temperature or at a lower temperature, and is typically conducted on the fiber spools after fiber spinning.

4. Unique Properties of Dow CEF

Dow CEF fibers have elasticity, high temperature stability, and chemical resistance

Elasticity
The low but significant level of crystallinity imparts elasticity to the Dow CEF fiber whereas no olefin fiber manufactured today is elastic. Elasticity is defined as the ability of a strained material to recover its original size and shape, immediately after removal of the stress that causes deformation[7]. DOW CEF fiber's favorable stretch (at least five times its original length before breaking) and elasticity or snap back (stretching to twice its length then, when released, recovering to within 25 percent of its original length) are a consequence of its low but significant level of crystallinity (Figure 3, page 8). Because of this, CEF can be successfully used in clothing applications where stretch is desired.

In contrast, conventional olefin fiber is highly crystalline, with degrees of crystallinity of greater than 50 percent. The crystals of conventional olefin fiber are also in lamellae form, unlike crystals in the Dow CEF fiber-forming substance which are in a fringe micelle form. As a result, conventional olefin fiber is stiff, and essentially, non-elastic. Typical olefin fibers (in their manufactured, "drawn," form) exhibit very low elongation before breaking (typically less than 50%) and therefore cannot be successfully used in today's apparel markets for stretch clothing.

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[7] KoSa Communications and Public Affairs (1999). *Dictionary of Fiber & Textile Technology.* Charlotte, N.C.: KoSa, p. 69.

Figure 3: Tensile data of Dow CEF fiber (a) versus drawn polypropylene fiber (b).

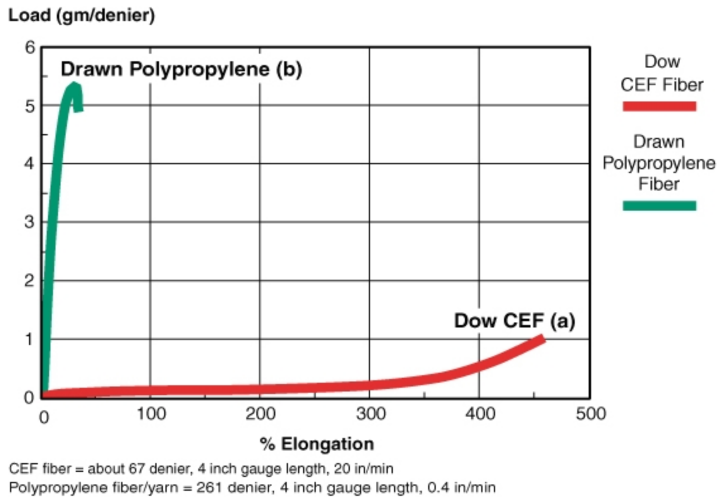
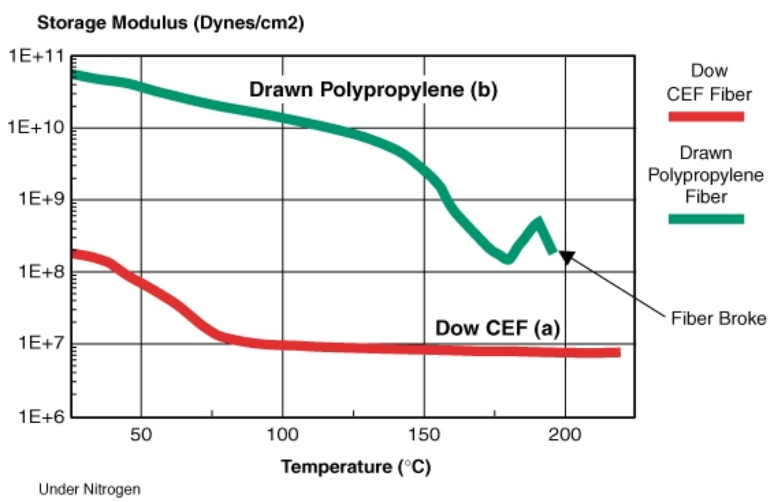


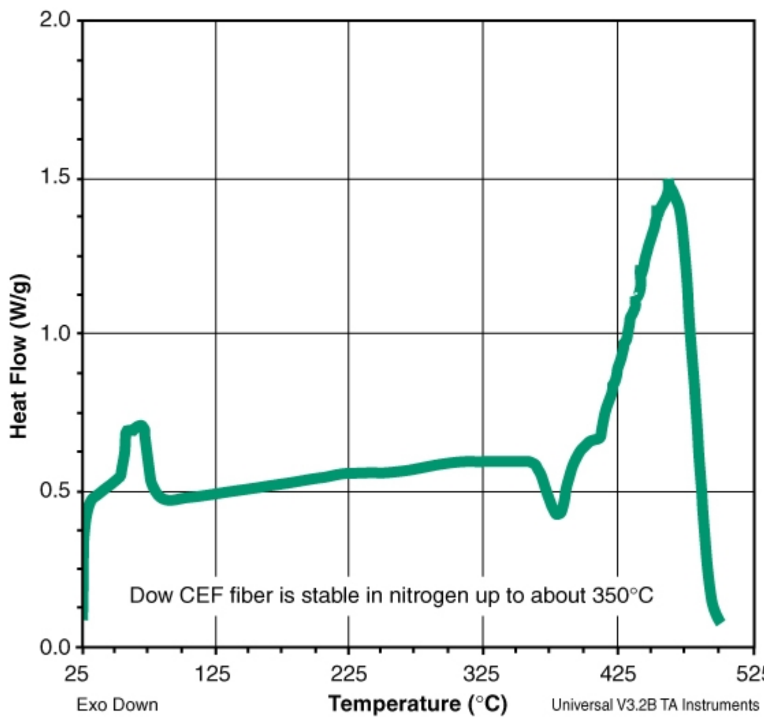
Figure 4: Dynamic mechanical thermal analysis (DMTA) of Dow CEF (a) versus drawn polypropylene fiber (b). Note: Dow CEF maintains its mechanical integrity well above its crystalline melting point (ca. > 68°C), whereas drawn polypropylene does not.



High temperature stability, chemical resistance
Dow CEF is substantially crosslinked with covalent crosslinks that connect adjacent polymer chains into a contiguous 3-dimensional polymer network (Figure 2a, page 6). This crosslinked polymer network structure allows Dow CEF to maintain its shape and mechanical integrity above its crystalline melting temperature. Above its melting temperature, the mechanical integrity of Dow CEF is provided by covalent crosslinks. In fact, Dow CEF retains its shape at temperatures up to 220°C – well in excess of conventional olefin's melting point which occurs at or below 170°C (Figure 4, page 8; Figure 7, page 10). Furthermore, Figure 5, below, shows the heat stability of Dow CEF in nitrogen up to about 350°C (> 220°C).

This crosslinked polymer network structure also allows Dow CEF to maintain its integrity in solvents which typically dissolve the starting polymer (Figure 7, page10). In contrast, conventional olefin fiber is not crosslinked and therefore loses shape and mechanical integrity and/or dissolves above its crystalline melting temperatures which range up to about 170°C.

Figure 5: DSC melting curve in nitrogen of Dow CEF from room temperature to 500°C.



Furthermore, Figure 5, above, shows the heat stability of Dow CEF in nitrogen up to about 350°C.

Figure 6: Photographs showing mechanical integrity of Dow CEF (a) versus conventional olefin fiber (b) which loses shape and integrity at 170°C.

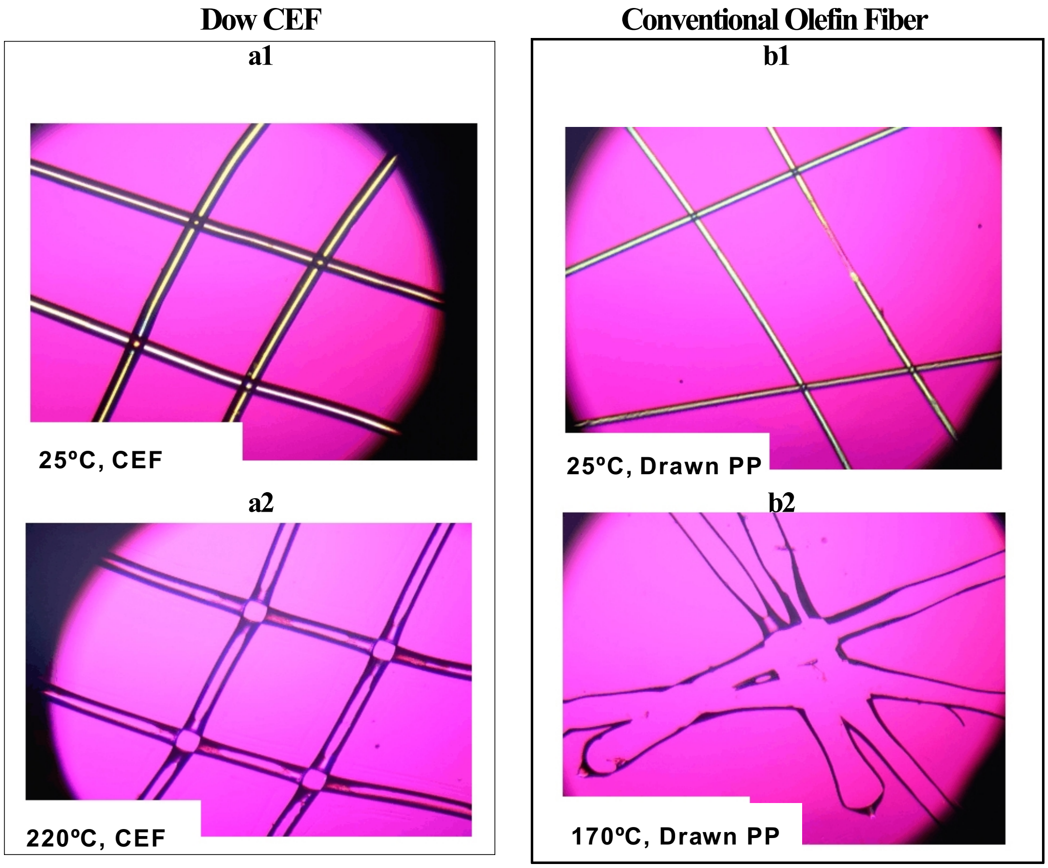
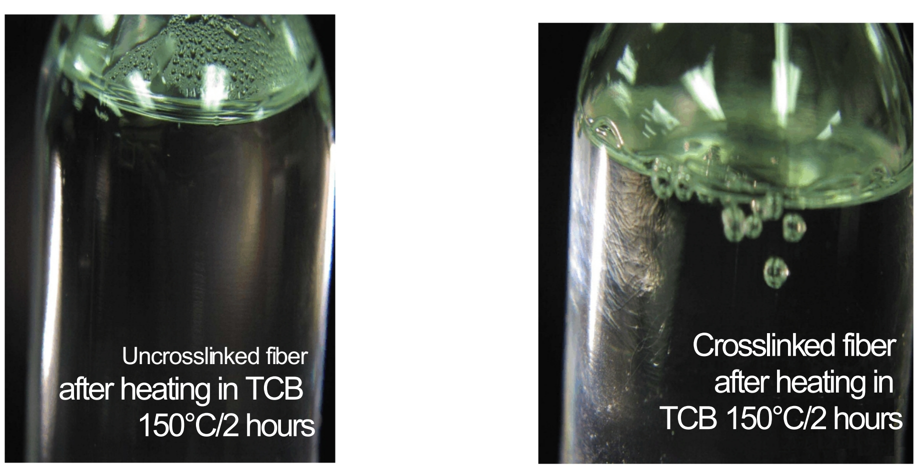


Figure 7: Photographs showing uncrosslinked fiber (a) which has dissolved in TCB after heating to 150°C and crosslinked Dow CEF fiber (b) which continues to maintain its shape and structural integrity under same conditions. Note: you can see the Dow CEF fiber still present in the TCB solvent.



(7a) **(7b)**

Dow CEF fiber's ability to withstand high temperatures has compelling advantages for the textile manufacturer: they can use more efficient dye and process methods requiring temperatures in excess of 170°C. There are also advantages for consumers: they can repeatedly wash, dry; and iron fabrics containing CEF at typical temperatures (up to 210°C) without destroying the stretch properties of CEF fiber. In contrast, since conventional olefin fiber manufactured today loses its shape and mechanical integrity in temperatures ranging from 105 – 170°C, it cannot withstand the rigors of high heat and repeated launderings. Consequently, conventional olefin fiber is not widely used in apparel applications today where the consumer seeks easy wash 'n' wear care.

Therefore, Dow CEF fiber is a uniquely differentiated olefin fiber and exhibits significant property improvements including shape retention and stability at very high temperatures plus improved fabric processing and consumer care characteristics not found in conventional olefin fiber manufactured today.

B. Properties of Dow CEF Versus Rubber Fibers

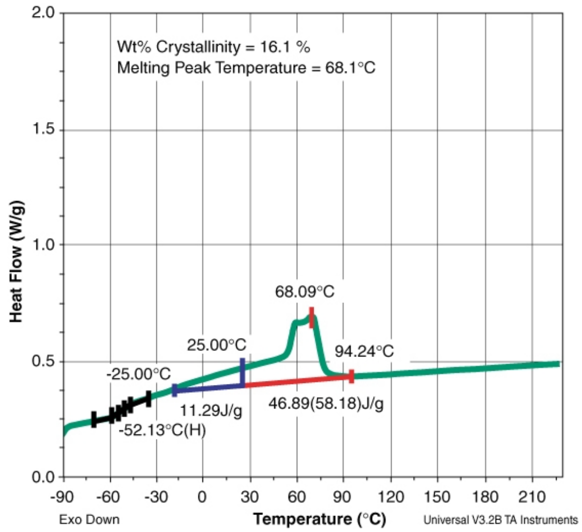
1. Differences in Chemistry and Morphology

Dow CEF fiber differs significantly from rubber fibers. The fiber-forming substance in Dow CEF is a polyolefin having a low but significant level of crystallinity. Therefore, Dow CEF does not fall within the FTC definition of a rubber (FTC definition of rubber, page 2).

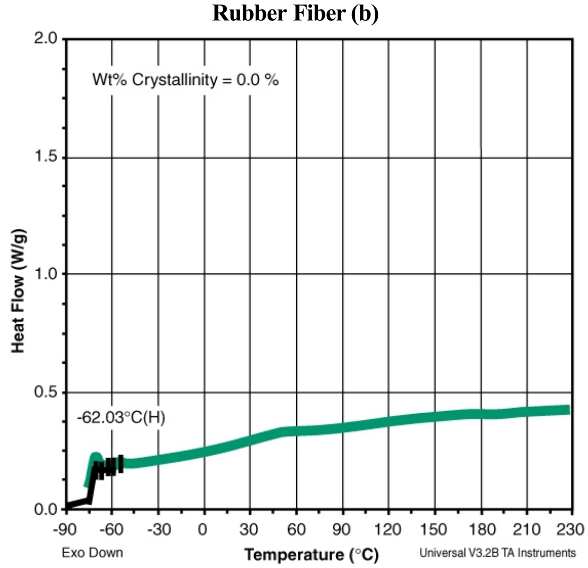
Evidence of low but significant crystallinity in Dow CEF fiber is provided by a standard differential scanning calorimetry (DSC) technique (Figure 8, page 12).
CEF fiber exhibits approximately 16% crystallinity and a melting point of approximately 68°C. In marked contrast, the rubber fiber exhibits no crystallinity as indicated by lack of a discernible DSC endotherm.

Figure 8: Differential scanning calorimetry of Dow CEF (a) versus rubber (b). Degree of crystallinity is determined from heat of fusion in melting endotherm.

Dow CEF (a)



Rubber Fiber (b)



2. Process Distinctions

Dow CEF fiber is produced by a melt spinning / crosslinking process. In contrast, rubber fibers are commonly made by extruding a pre-cured aqueous latex dispersion into an acid bath. This extrudate is coagulated to solidify the rubber. The resulting thread then proceeds into a drying and a curing oven. Alternatively, rubber fibers can be made by slitting prevulcanized sheets (cut rubber).

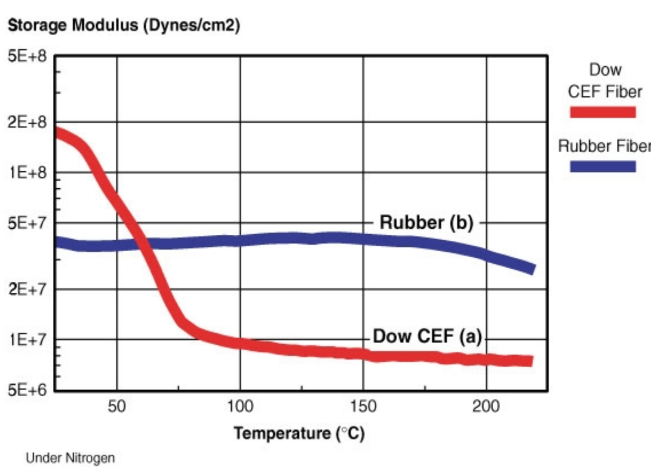
Therefore, CEF and rubber fibers are manufactured from radically different materials via different processes.

3. Property Differentiation

Rubber fibers are not crystalline, whereas CEF fibers have a low but significant level of crystallinity. As a result, CEF fibers have unique differentiating properties.

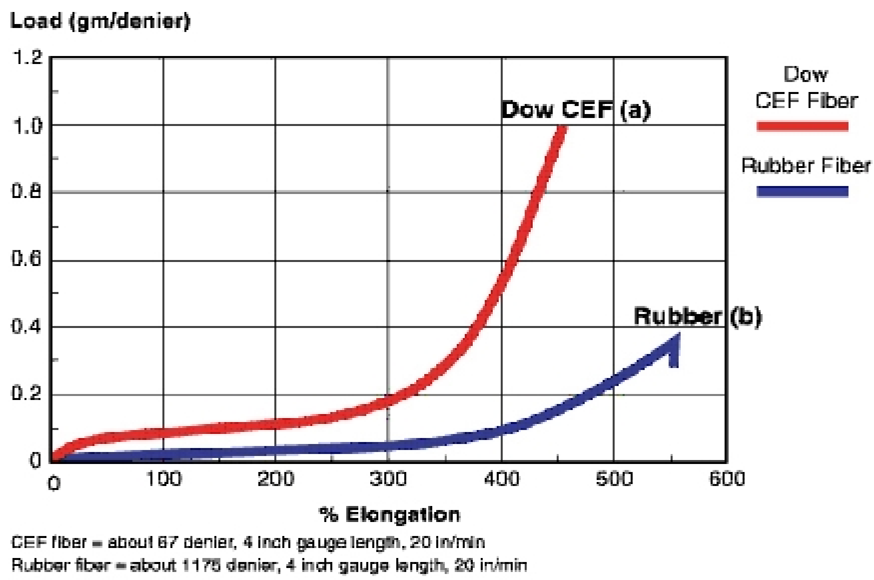
Rubber fibers are amorphous (non-crystalline) polymers, and are vulcanized typically using sulfur and heat. As a result of this chemical structure, rubber fibers have uniform tensile properties across a broad temperature range. In contrast, CEF fibers have mechanical properties which derive from both the crystallinity and covalent crosslinks between carbon atoms – without using sulfur. At low temperature, the presence of crystallites dominates the mechanical properties of CEF. As the temperature is raised above the crystalline melting point (ca. > 68°C), the modulus of CEF fibers drops by an order of magnitude; the modulus above melting point is determined solely by the degree of covalent crosslinks. Therefore, CEF has unique temperature-dependent mechanical properties which are radically different from those of rubber fibers. Since rubber has absolutely no crystallinity, the modulus is
essentially flat with respect to temperature increases. The figure shown below (Figure 9) dramatically demonstrates this feature.

Figure 9: Dynamic mechanical thermal analysis (DMTA) of Dow CEF (a) versus rubber fiber (b).



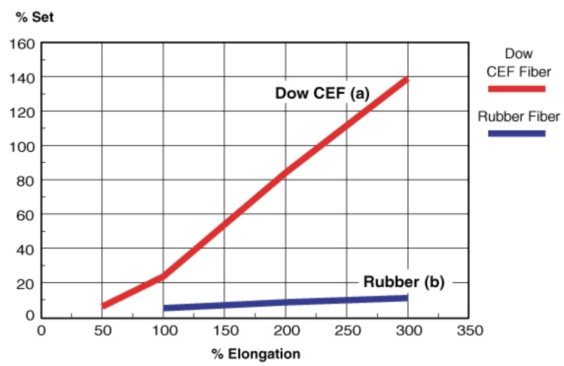
Secondly, since CEF has a low but significant level of crystallinity at room temperature, the fiber exhibits higher tenacity (strength) at break compared to rubber fiber which is amorphous (Figure 10, below). The improved mechanical strength and toughness of Dow CEF is important to survive rigorous textile fabrication processes.

Figure 10: Tensile data of Dow CEF fiber (a) versus rubber fiber (b) showing lower tenacity at break of rubber fiber due to rubber's amorphous character.



And last, since Dow CEF has a low but significant level of crystallinity at room temperature, CEF exhibits higher tensile set (lower elastic recovery) than rubber when extended to greater than 100% elongation. The 5-cycle tensile set measurement (Figure 11, page 15) shows this contrasting behavior between CEF and rubber fiber. The permanent set of CEF is a direct manifestation of its crystallinity and stands in marked contrast to the low tensile set of rubber fibers.

Figure 11: Tensile set data of Dow CEF (a) versus rubber (b) showing permanent set of Dow CEF versus negligible set of rubber fiber (5 cycle elongation).



Summary Table #1

Property	**CEF**	**Conventional Olefin** [8]	**Rubber**
Crystallinity, wt%	12 to 16	> 50	0
Elongation, %	> 400	< 15-200	600 – 800
Breaking Strength (gm/den)	> 0.9	1.7 – 6.8	0.45
Initial Modulus	0.3	34 – 56	0.02
Density (gm/cc)	0.87 – 0.875	0.90 – 0.91	~ 1.0
Dissolution Characteristics	Does not dissolve	Dissolve	Does not dissolve
Temperature Stability	Up to > 220°C	Up to 170°C	Up to 350°C
Manufacturing Method	Melt spinning followed by crosslinking	Melt spinning	Extrusion/vulcanization or splitting prevulcanized sheets

[8]Polypropylene drawn fiber data (elongation, breaking strength, initial modulus) from Fourne, Franz (1998). *Synthetic Fibers: Machines and Equipment, Manufacture, Properties*. Cincinnati, Ohio: Hanser/Gardner Publications, Inc. pp. 840 & 850.

II Dow CEF: A New Generic Subclass — Lastol

A. Why Dow Seeks a New Generic Subclass

Dow CEF meets the broad definition of olefin fiber. However, CEF has unique elastic properties, thermal resistance, molecular structure, morphology, and property improvements which differentiate it from conventional olefin fiber manufactured today. Today's olefin – largely seen in carpet, thermal underwear, and socks – does not offer the consumer stretch or the easy-care characteristics gained through high temperature tolerance. To textile mill producers, CEF enables process economies and the production of new products with atypical stretch and performance properties. To the consumer, CEF offers a wider choice in garments containing stretch fabric plus the benefit of easy-care laundering at higher temperatures without degradation of the stretch fiber.

B. Proposed New Generic Subclass Name – *Lastol*

Dow recognizes that a new subclass name should capture the chemical structure while also referencing the radical distinction. Dow has determined *Lastol* to be the descriptive new subclass because it connotes an elasticized olefin. Dow proposed the following definition for *Lastol*:

A manufactured crosslinked elastic fiber in which a) the fiber-forming substance is a synthetic polymer, with low but significant crystallinity, composed of at least 99 percent by weight of ethylene and at least one other olefin unit, and b) wherein the fiber exhibits substantial elasticity and heat resistance properties not present in traditional olefin fibers.

III Commercialization Plan and Time Table

Commercialization of Dow CEF is imminent – occurring early in the second quarter of 2002.

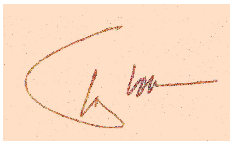
Beginning in 1999, Dow identified and began working with developmental partners who are leaders in the fiber manufacturing and apparel industry around the world. Since the second quarter of 2001, CEF has been successfully made on commercial-scale spinning equipment, with resulting quantities subsequently produced and used in a wide range of fabrics including both knits and wovens. These fabrics have been used to make a variety of goods, but most notably for those in the apparel market and its various end-use segments.

Garments made with CEF have been tested and found to meet or exceed all standard industry specifications. The market testing process of garments with leading retailers is presently underway, with completion expected within the coming weeks.

If you have questions regarding this Petition, please contact Margaret Rogers in Dow's Washington D.C. office (202 429-3403) Stephen Krupp, our business attorney (979 238-2889). Steve is located in Freeport, Texas.

Thank you for your time and consideration.

Sincerely,



Global Business Director
Dow Fiber Solutions

Cc: Stephen Krupp
Margaret Rogers