POLYURETHANES, POLISHING ARTICLES AND POLISHING SYSTEMS THEREFROM AND METHOD OF USE THEREOF

Field of the Disclosure

The present disclosure relates to polyurethane materials and articles containing such materials.

Background

Polyurethane synthesis and film fabrication are described in, for example, U. S. Pat. Publ. 2020/0277517 and U.S. Pat. No. 10,590,303. Use of polyurethane films in polishing articles is described in, for example, U.S. Pat. Nos. 10,071,461 and 10,252,396.

Summary

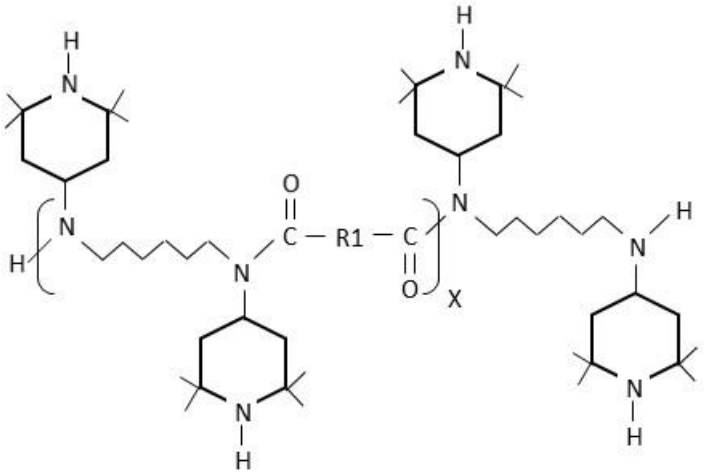
In one aspect, there is provided a polyurethane comprising a reaction product of a reactive mixture including,

a polyol having a number average molecular weight of at least 400 Daltons;

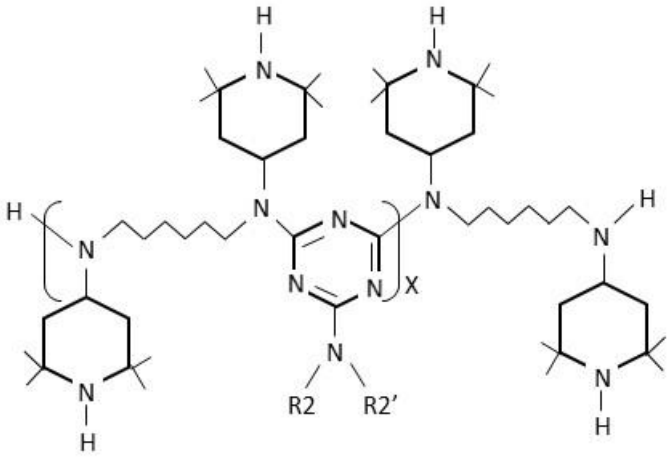
a diol chain extender having a molecular weight less than 400 Daltons;

a diisocyanate; and

a multifunctional amine according to at least one of Formula I and Formula II



Formula I



Formula II

wherein,

X is an integer from 0 to 10, inclusive of the endpoints,

R1 is a linear or branched aliphatic group, cyclic aliphatic group, aromatic group or a compound containing an aromatic group having from 2 to 20 carbon atoms,

R2 is a linear or branched alkyl group having from 1 to 20 carbon atoms, and

R2' is hydrogen or a linear or branched alkyl group having from 1 to 20 carbon atoms.

In another aspect, there is provided a polishing pad comprising a polishing layer having a working surface and a second surface opposite the working surface, wherein the polishing layer includes the polyurethane as defined herein.

Brief Description of the Figures

The disclosure may be more completely understood in consideration of the following detailed description of various embodiments of the disclosure in connection with the accompanying figures, in which:

FIG. 1 is a schematic cross-sectional diagram of a portion of a polishing layer in accordance with some embodiments of the present disclosure.

FIG. 2 is a schematic cross-sectional diagram of a polishing pad in accordance with some embodiments of the present disclosure.

FIG. 3 illustrates a schematic diagram of an example of a polishing system for utilizing the polishing pads and methods in accordance with some embodiments of the present disclosure.

Detailed Description

Polyurethanes are versatile resins that are, generally, synthesized from mixtures of polyols, i.e. an organic compound having at least two alcohol functional groups, and polyisocyanates. i.e. an organic compound having at least two isocyanate functional groups. In addition to these components, other compounds may be added during synthesis including chain extenders, chain termination agents, crosslinkers, catalysts and the like. Both thermoplastic and thermoset polyurethanes are readily

synthesized and, due to the large breadth in the compounds that may be used for their synthesis, a wide range of material properties may be achieved. Due to their toughness, abrasion resistance and chemical resistance, polyurethanes are often used as protective coatings and films.

One area where polyurethane films have recently been employed is as abrasive materials for various polishing applications, for example, Chemical Mechanical Planarization (CMP) polishing applications. In a typical CMP application, a surface of a substrate, e.g. a semiconductor wafer, is brought into contact with a surface of a polishing pad, often in the presence of a working liquid. The substrate is moved relative to the pad under a designated force or pressure, causing removal of material from the substrate surface. The polishing pad often has multiple layers including a polishing layer, i.e. the layer of the pad that contacts the substrate, and a subpad. The design of the polishing layer is critical