A Coffee Bean Flour that Maximizes the Beneficial Effects of Coffee

Background:
Green coffee extract from unroasted coffee beans has attracted worldwide attention as a dietary supplement. Chlorogenic acid (CGA) antioxidants found in green coffee beans are clinically proven to beneficially modulate sugar metabolism and the insulin response as well as may also lower risks for cardiovascular disease, cancer and certain neurodegenerative conditions. However, green coffee beans have an unpleasant flavor profile and are difficult to mill. While roasting improves their flavor, aroma and color as used for coffee beverages, it also unfortunately degrades CGA and necessitates the packaging of green coffee extract as capsules.

The current invention relates to a new method for partially baking (“par-baking”) green coffee beans and milling them into a fine coffee flour that not only preserves the CGA levels but also retains the caffeine. This versatile product has multiple commercial uses. The milled flour is palatable as an ingredient in foods and beverages including breads, cereals, baked desserts, energy bars/snacks, smoothies and other edible goods. It can be used as a coffee alternative in which ~4 grams flour provides the same caffeine content as a cup of coffee. The milled par-baked coffee bean can also be packaged as tablets or capsules at varying doses. Alternatively, the coffee flour may be combined with skinceuticals or cosmetics for its beneficial antioxidant effects on skin. The coffee flour has a low cost of production with multiple health and/or dermatological benefits and uses.

Summary:
- Invention is the partial baking of green coffee beans at temperatures significantly lower than traditional roasting.
- Up to 4X more CGA in par-baked vs. regularly roasted beans (~8.6-11% w/w CGA by chemical & UV analyses).
- Par-baked and milled green coffee beans have unexpected characteristics including a pleasant nutty flavor, golden tan color, and limited moisture content.
- Par-baking renders the otherwise tough green coffee bean easier to mill, allowing the production of a coffee bean flour having any desired particle size.
- Controlled residual moisture enables rapid flour dispersal and release of CGA into aqueous foods.
- Ideal for adding to foods without any gritty mouth feel.
- Powder can be manufactured from organic and/or decaffeinated beans using various coffee species.

Advantages:
- Formulation versatility allows the powder to be used in food and beverage products, capsules, and skin care products.
- Improved flavor & aroma when compared to green coffee.
- CGA antioxidants and limited moisture prolong its shelf life.
- Easily flavor-modified with sugar, high intensity sweeteners, flavor extracts, and other ingredients.
- CGA beneficially modulates sugar uptake, insulin response, and other biological indices.
- Unlike roasted coffee, the light color of milled par-baked coffee minimally alters food product appearance.
- Benefits of par-baked bean flour over coffee cherry flour:
  - Generally Recognized As Safe (GRAS)
  - High CGA antioxidant and caffeine content
  - Higher caffeine content (= traditional roasted beans)
  - Minimally changes the color and flavor of products