HIGH EMISSIVITY COATING COMPOSITIONS AND MANUFACTURING PROCESSES THEREFORE~~THEREFOR~~

BACKGROUND

Technical Field

The present disclosure relates generally to compositions for high emissivity coatings that can be applied to various types of substrates, and to processes for manufacturing high emissivity coating compositions. More particularly, the present disclosure relates to (1) high emissivity coating compositions with enhanced strength properties, (2) high emissivity coating compositions in which titanium dioxide (TiO_2) is used an emissivity enhancing agent; and (3) manufacturing processes for cost-effectively producing high emissivity coating compositions using an industrial waste source or stream.

Description of the Related Art

Increasing demand for energy and rising energy costs throughout the world have inevitably increased the need for energy users to save or conserve energy, particularly among industrial entities. In many instances, industries that use fired heaters or furnaces, such as refineries and petrochemical complexes, have attempted to maximize fired heater efficiency to thereby reduce fuel consumption. High emissivity coating technology has become a proven means for various high temperature applications to effectively increase radiant heat transfer and save energy without compromising process reliability and safe operation.

Emissivity (symbolically represented as ε or *e*) can be broadly defined as the relative ability of a surface to emit energy by radiation. More particularly, emissivity can be defined as the ratio of energy radiated by a particular material to energy radiated by a blackbody at the same temperature. Higher emissivity corresponds to an increase in thermal efficiency. An increase in thermal efficiency attributed to high emissivity coatings in high temperature fired heater or furnace applications results in an increase in fired heater or furnace performance or output and/or a decrease in fuel consumption and overall energy demand.

The benefits and advantages of high emissivity coatings have led to various research and development efforts over the years to improve the performance of high emissivity coatings. In particular, research has been conducted to develop emissivity coating compositions that include emissivity enhancing agents (“ emissivity