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(54) Title: A PROCESS FOR THE PRODUCTION OF ETHYLENICALLY UNSATURATED CARBOXYLIC ACIDS OR ESTERS AND A CATALYST THEREFOR

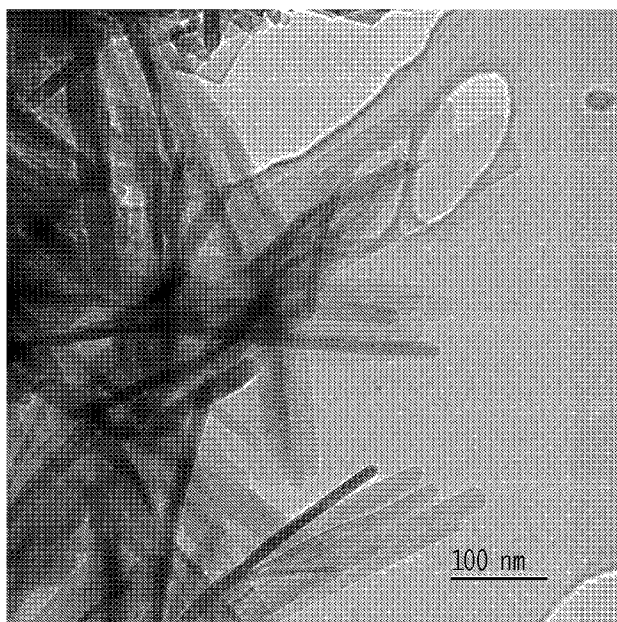


Figure 8 TEM Image of Example 11 at 100nm scale showing presence of nano-rods

(57) Abstract: A method of producing an ethylenically unsaturated carboxylic acid or ester such as (meth) acrylic acid or alkyl esters thereof, for example, methyl methacrylate is described. The process comprises the steps of contacting formaldehyde or a suitable source thereof with a carboxylic acid or ester, for example, propionic acid or alkyl esters thereof in the presence of a catalyst and optionally an alcohol. The catalyst comprises group II metal phosphate crystals having rod or needle like morphology or a suitable source thereof. The phosphate may be a hydroxyapatite, pyrophosphate, hydroxyphosphate, PO_4^{2-} phosphate or mixtures thereof. The group II metal may be selected from Ca, Sr, Ba or mixtures thereof, for example, strontium hydroxyapatite and calcium hydroxyapatite. A catalyst system comprising a crystalline metal phosphate catalyst and a catalyst support is also described. The metal phosphate has rod/needle like morphology.

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