

ABSTRACT

A hydrocarbon pyrolysis system and a hydrocarbon pyrolysis method. The hydrocarbon pyrolysis system comprises a reactor defining an interior chamber, an operating temperature in the interior chamber being controllable; and at least one catalytic membrane disposed in the interior chamber, wherein each of the at least one catalytic membrane comprises a support layer disposed between a catalytic layer and a hydrogen purifying layer, wherein the catalytic layer is configured to react with a hydrocarbon to form hydrogen and carbon nanotubes simultaneously during hydrocarbon pyrolysis, wherein the hydrogen purifying layer is configured to selectively remove hydrogen from the interior chamber during hydrocarbon pyrolysis.

(FIG. 4A)