

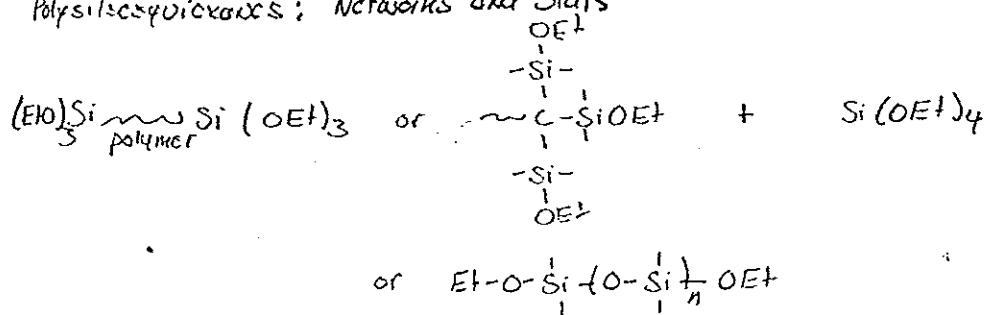
11/14/98

①

Nanocomposites:

End functionalized PEI star + layered silicate
problem, prove intercalation really occurs

Polysilsesquioxanes: Networks and Stars



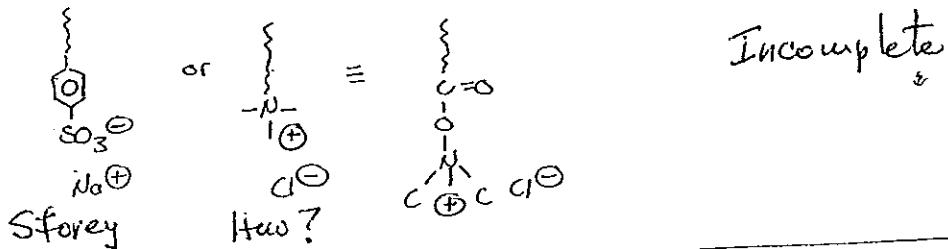
novel,
useful,
unobvious } PATENT

~~using OEt~~
~~of OEt~~
New linking process
for stars, New star
New networks

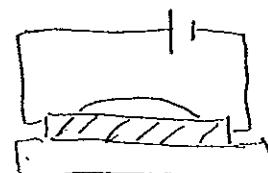
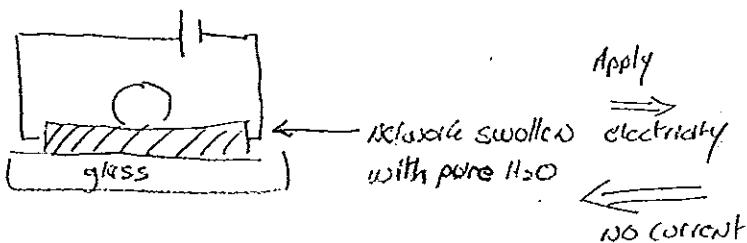
See Wilkes

Ioniceric Amphilic Network:

What if the network contained groups such as:



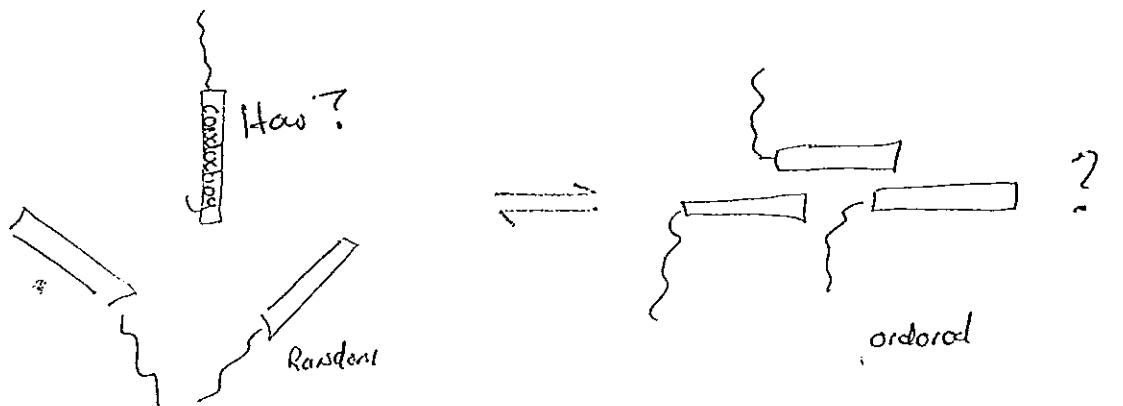
measure charges through contact angle?



Chancy.
Very incomplete!

②

would in one state (whether electricity is applied or not) will there be ordering and in the other disorder?



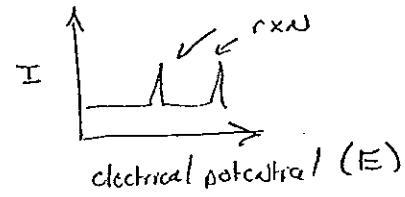
Incomplete

Comments:

Dr. Tessie!

look at changes in γ gel (interfacial tension of the gel), make sure these are due to applications of current.

look to see whether electron transfer reactions occur. These might be avoided by using low voltages $< 1.0V$.



Pore size may change due to $- E, pH, IS$ (ionic strength/it)

uses - ① motor in which bolt is immersed in two separate solutions of different ionic strength, ② Drug release controlled by current,

Incomplete

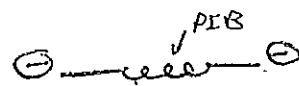
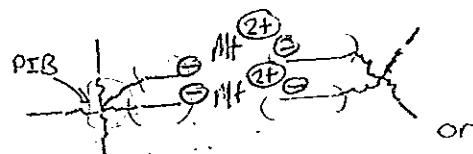
(3)

Dr Roscher:

Measure of contact angle may not work, it is possible that the droplet might fly apart before any changes in contact angle are detected.
Make the material non-centro symmetric, this could result in an electrorestrictive material.

Reversible Networks - (similar to cellulose ionomers)

An amphiphilic network with ionomeric crosslinking sites.



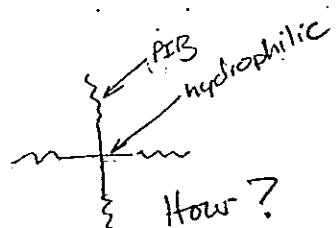
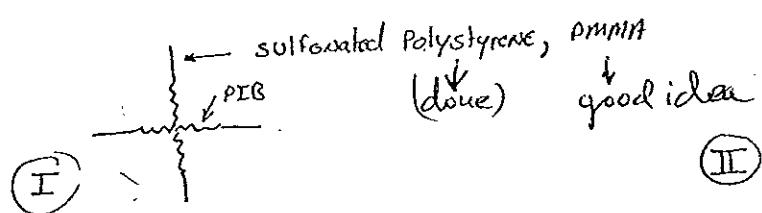
Incomplete

Dr. Teyssié - may be affected by solvent, pH, heat, etc.

Differs only by the fact that all crosslinks are of the ionomer type.

Possible use - rheology control by control.

Amphiphilic stars:

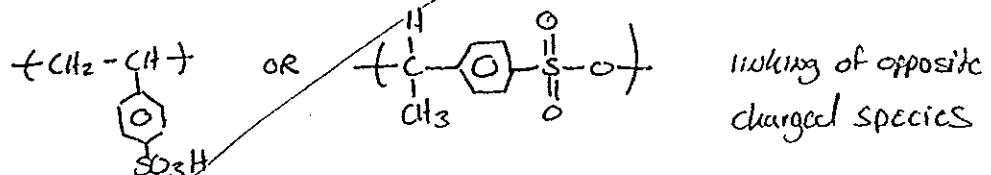


Dr. Harwood - monomer is usually $\text{CH}_2=\text{CH}-\text{SO}_3^-$ with KI stabilizer that must be



(4)

removed before polymerization. Polymerization might be affected by lowering the pH to give :



- ³ Might be able to cross over from PIB to polystyrene by ATRP,
Done by Matrasewski
Ivan

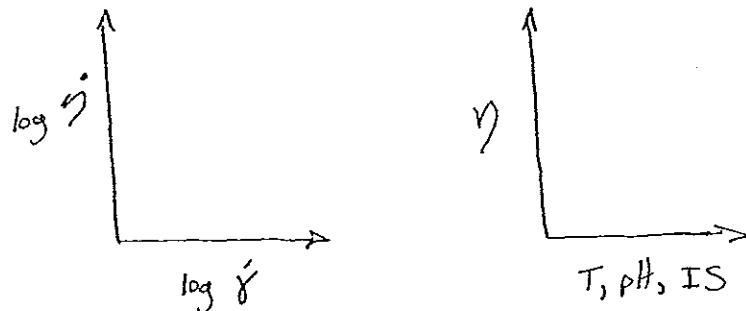
possible uses - surfactants (I - aqueous (II) - hydrocarbon).

They might also be useful in solvent purification if they can be easily removed. They may also show interesting rheological properties under various conditions (temperature, pH, ionic strength), May be of use in emulsions. Viscosity

improvers with chelating groups - traps metals and water.

Dr. Teyssie - look at dynamic viscosity vs. shear rate, or static viscosity,

hydrates
break them &
then &



Do both experiments in different solvent types.

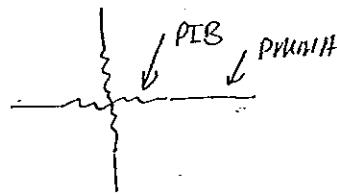
Hydrophobic peptides :

---NH_2 Have not been able to reach Don't Smith Ycr.

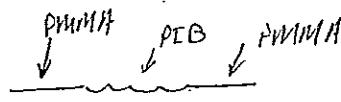
INCOMPLETE

⑤

Glossy / Robbery stars / blocks

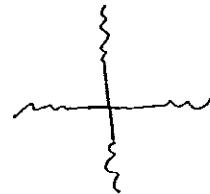


Kraton type materials - compatibilizers
for blends. Good idea (by ATRP)



Kraton type materials. Block compatibilizers,
interesting sealants if α, ω functionalized.
See Dr. JPK's book.

Good idea (by ATRP)



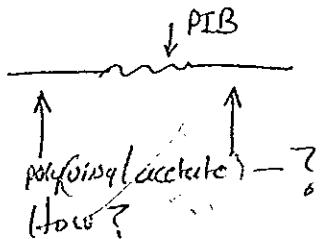
? How? (PMMA prevent $B^{\oplus} pzu$)

~~~~~

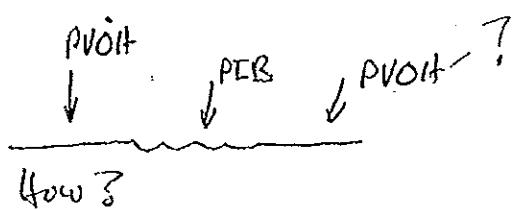
? How?

- 11 -

## Blocks or Stars



Interesting adhesives, use in paints?  
Coatings?



## Athetics, Surfactants, Poly(vinyl butyral)

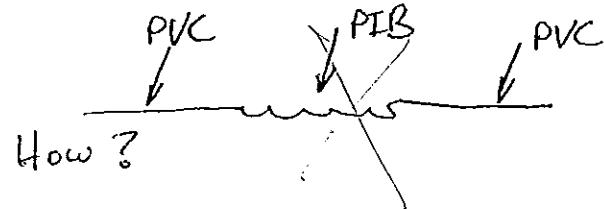


Kraton type materials — see Dr JPK's  
text. This could work. Good idea

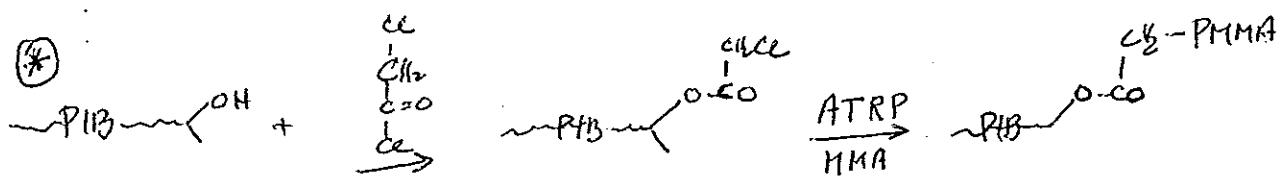


Rubber for electrical tubing, hoses.  
Lubricant.

I wish this would go!

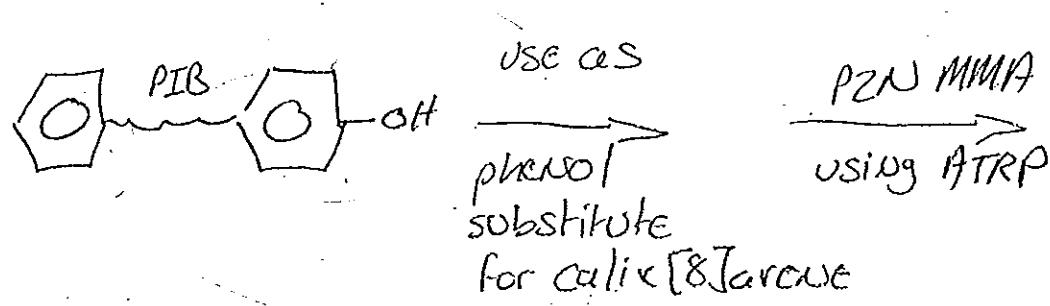
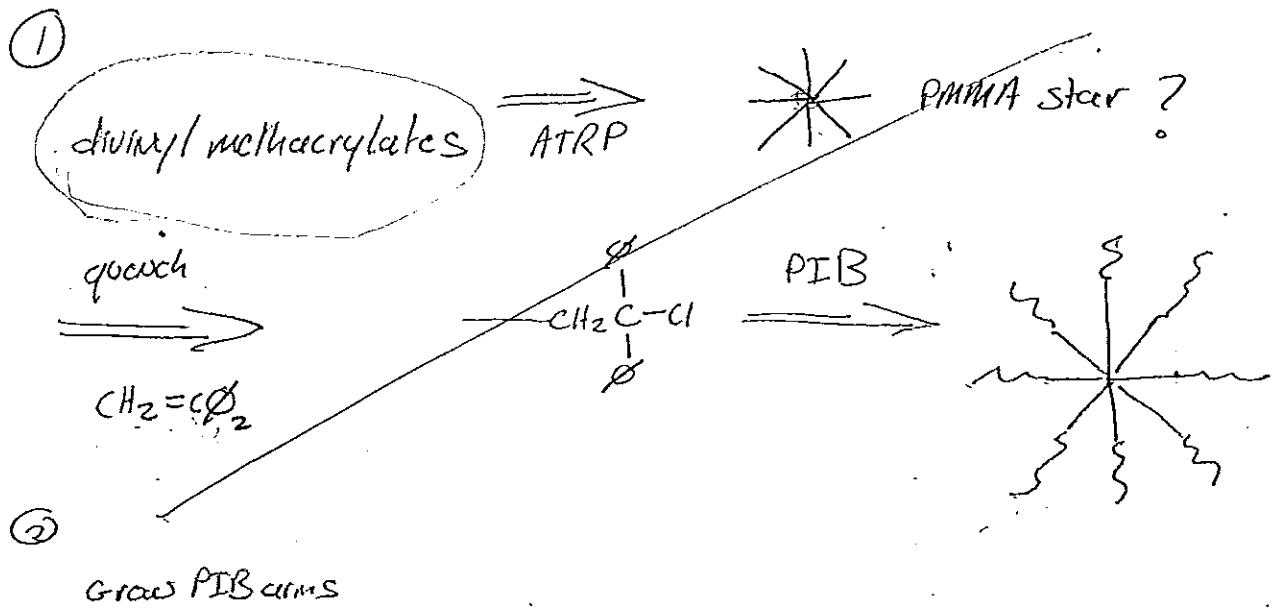


## PVC with interval ~~plasticizers~~



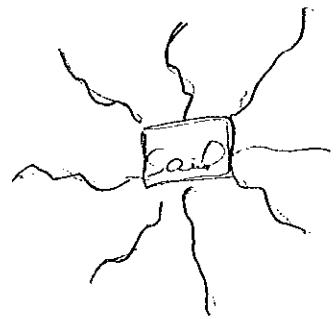
We Know - Calix [8]arene  $\xrightarrow{\text{PIB}}$  PIB Star  $\xrightarrow[\text{ATRP}]{\text{Vinyl = MMA}}$  good idea  
 This can be done (see above)

How to get PIB on the outside? Yes, how?



Polyilsesquioxanes:

Networks (three types)



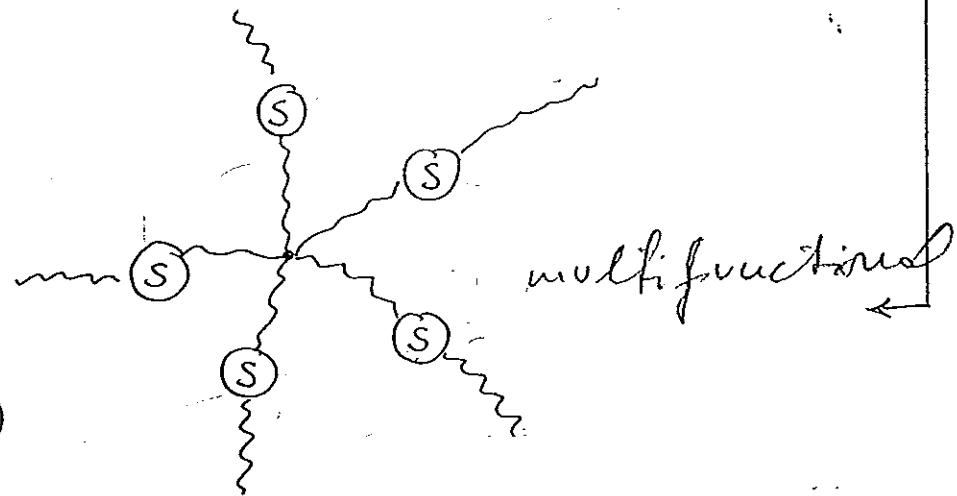
heat stable  
oil additive  
FILLER  
monofunctional

(I)



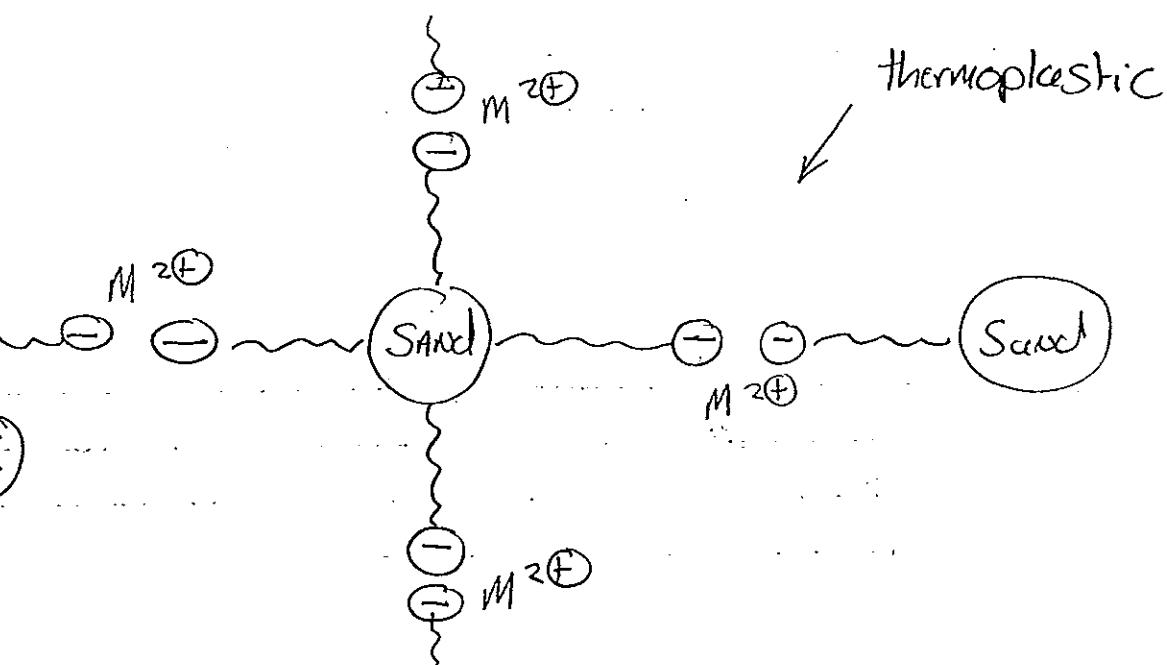
difunctional  
Thermosets

(II)



multifunctional

(III)



thermoplastic

USES:

The thermosetting networks (I and II) could have many potential uses:

- ① gaskets / seals which show improved solvent resistance and possibly some barrier properties to gases due to the incorporation of inorganic material. These materials should also find use at high temperatures - engine components, maybe aerospace applications.
- ② belts - again, should show strength at high temperatures. May not require addition reinforcing materials such as fibers.
- ③ hose / tubing - depending on overall stability may find many uses.
- ④ Strength / brittleness will probably depend on the wt % silica. It might be possible to form objects which are tough, almost hard like ceramic, and yet the material would be impact resistant due to PTFE. Anything which is ceramic could be replaced dishes, cookware, mugs, pottery, floor tiles, table tops, sinks, toilets, etc. (conversely) These materials could also be used in place of many traditional rubbers.

For the thermoplastic network  $\text{III}$

The uses could be similar. Use temperatures would have to be less than the thermosetting material. Also the material may not hold up under various conditions (how about resistance to water?). Its strong point would be that you could recycle the material.

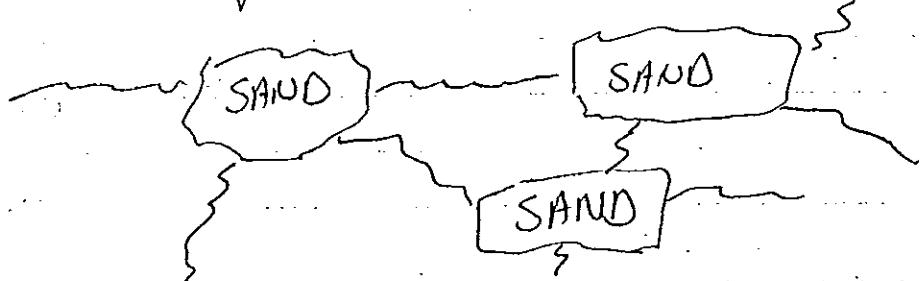
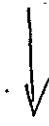
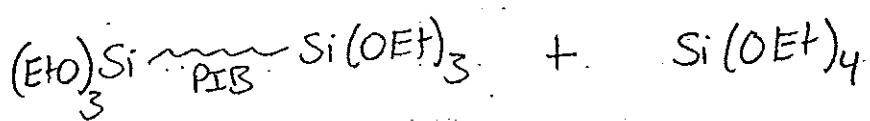
Another material related to  $\text{III}$  could be



It may have similar uses as material  $\text{III}$ .

How CAN THEY BE FORMED?

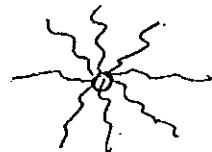
$\text{I}$



(II)

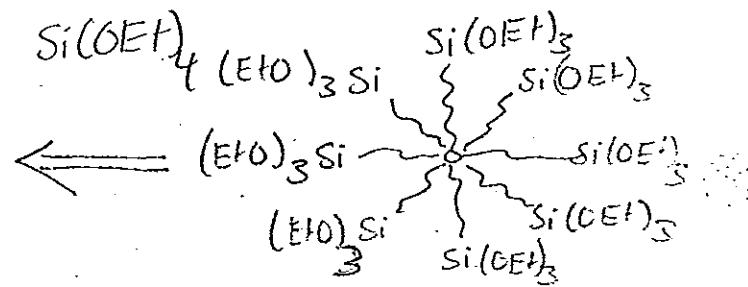
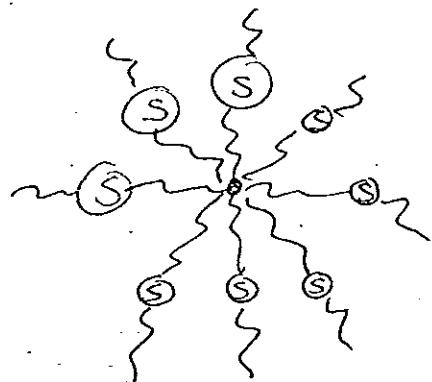
Calix[8] arene

PIB



8-Armed PIB star  
with vinyl end groups

hydrosilation



(III)

reacts with acetyl sulfate  
to form  $\text{SO}_3^-$  groups

PIB

OAc

reacts with  $\text{Si}(\text{OEt})_4$

Dr. JPK wrote previously

this meant

$\text{Si}(\text{OEt})_3$

