About OMICS Group

OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and events. Established in the year 2007 with the sole aim of making the information on Sciences and technology 'Open Access', OMICS Group publishes 400 online open access scholarly journals in all aspects of Science, Engineering, Management and Technology journals. OMICS Group has been instrumental in taking the knowledge on Science & technology to the doorsteps of ordinary men and women. Research Scholars, Students, Libraries, Educational Institutions, Research centers and the industry are main stakeholders that benefitted greatly from this knowledge dissemination. OMICS Group also organizes 300 International conferences annually across the globe, where knowledge transfer takes place through debates, round table discussions, poster presentations, workshops, symposia and exhibitions.

About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Sensing Heavy Metals for Environmental Monitoring

Mahnaz M. Abdi, Amir Reza Sadrolhosseini, Min Min Aung
Aishah Abdullah

Department of Chemistry, Faculty of Science, Universiti Putra Malysia, Selangor, Malaysia

Heavy metal poisoning

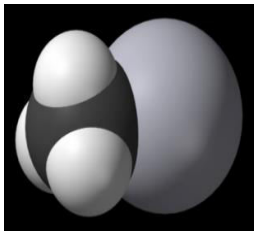
Heav metals:

- Any metal with high relative atomic mass, *density* greater than 4 g/cm^3

- have a tendency to Bioaccumulate

- High amounts of mercury can damage the central nervous system which can cause **memory loss**, **lack of coordination**, kidney problem, **reproductive problems**, and possibly **death**.

- **Lead** is especially dangerous for unborn babies and young children causing potentially permanent learning and behavior disorders



$H_3C\text{-}Hg^+X^-$





Heavy metal poisoning

Minamata disease (neurological syndrome) it caused from methylmercury in the industrial wastewater from the Chisso Corporation's chemical factory, Japan in1956.



The crippled hand of a Minamata disease victim





Source of heavy metals

Water: drinking water (lead pipe), leaching from metal mine can cause river pollution

Food: accumulation of mercury in fish tissue, lead-soldered cans

Air: metal processing factory such as smeltery and battery manufacturers, leaded gasoline.

dust and soil: leaching of metal ions from the soil into lakes and rivers by acid rain.
chipped or flaking paint



China Pollution River



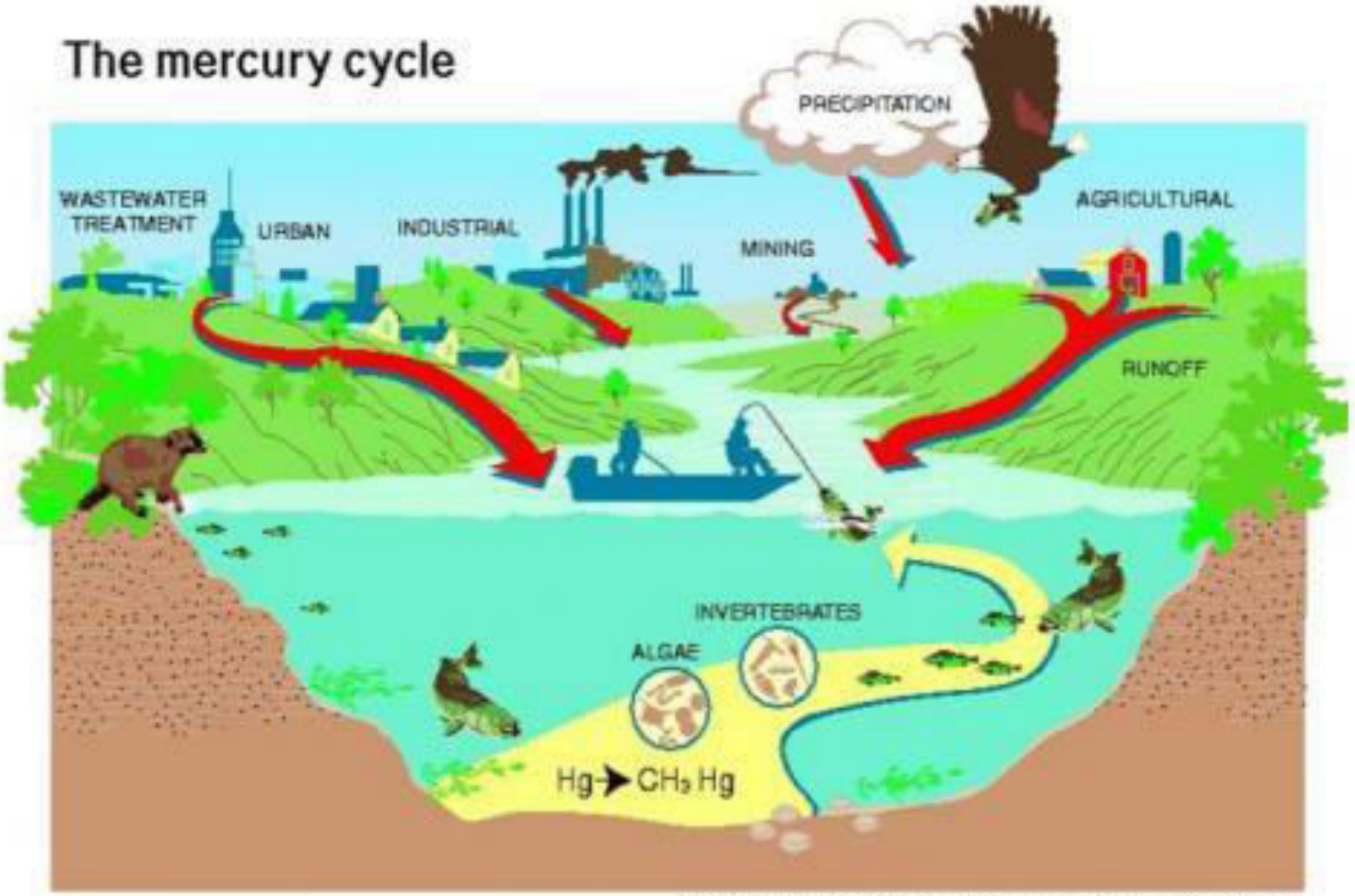


Acid mine drainage (AMD)



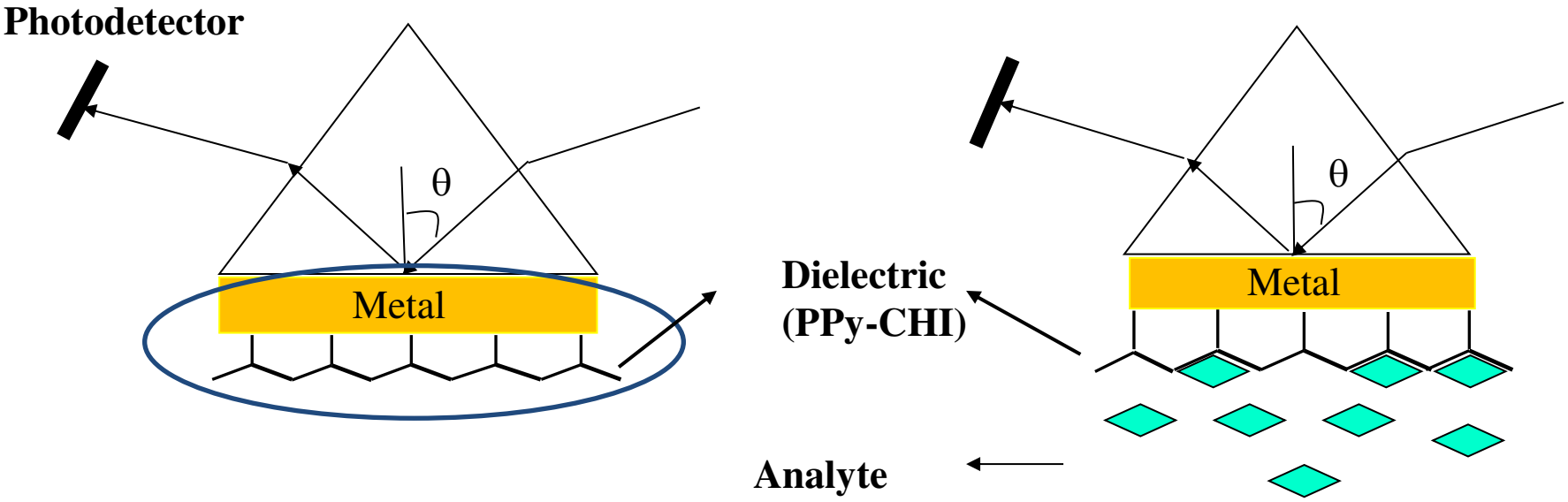
Abandoned mining

The mercury cycle



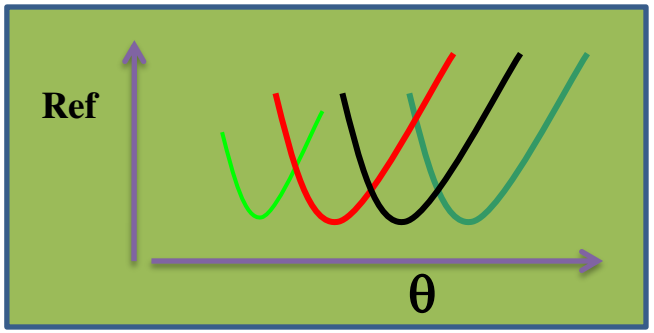
(Illustration by Connie J. Dean, U.S. Geological Survey)

Surface Plasmon Resonance

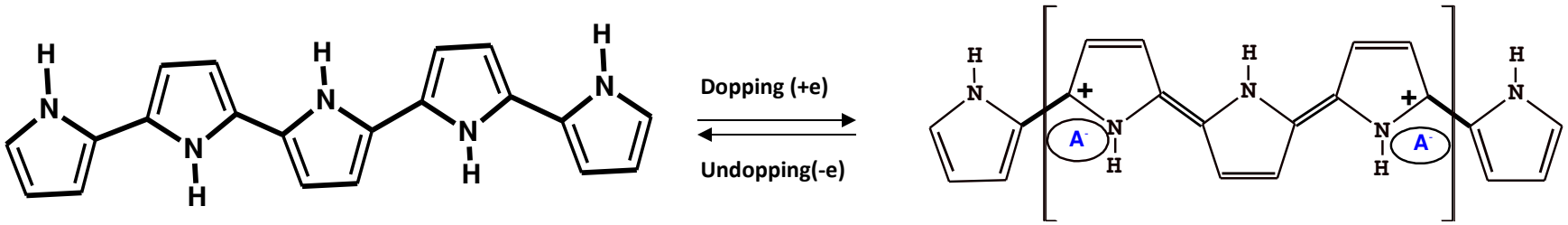


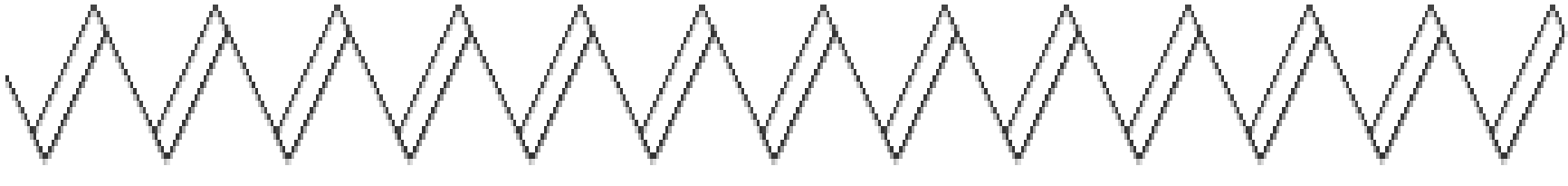
Before analyte binding:
Refractive index: n, k

After binding:
$n_{new} = n+\Delta n \quad k_{new} = k+\Delta k$



Conducting polymers

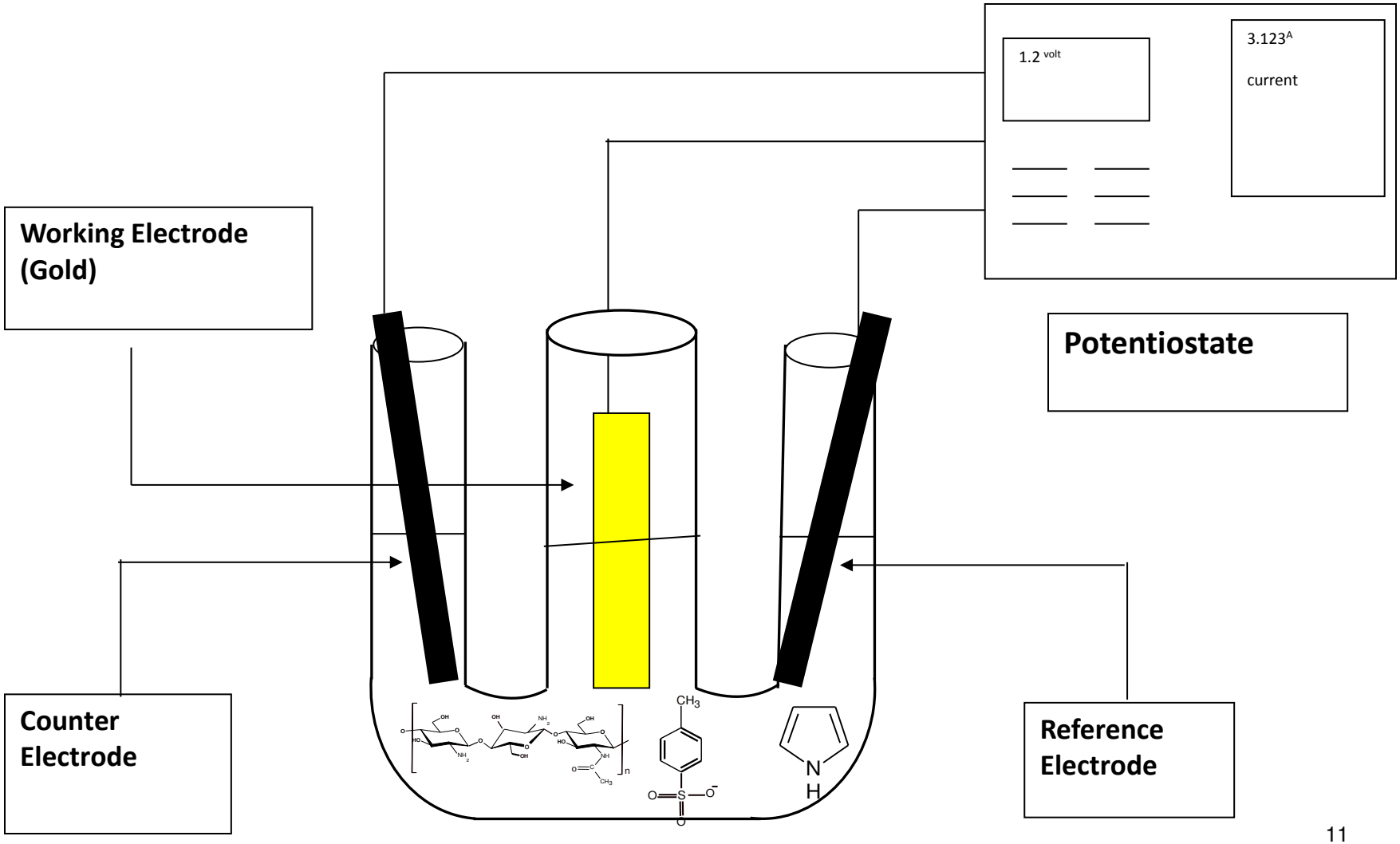


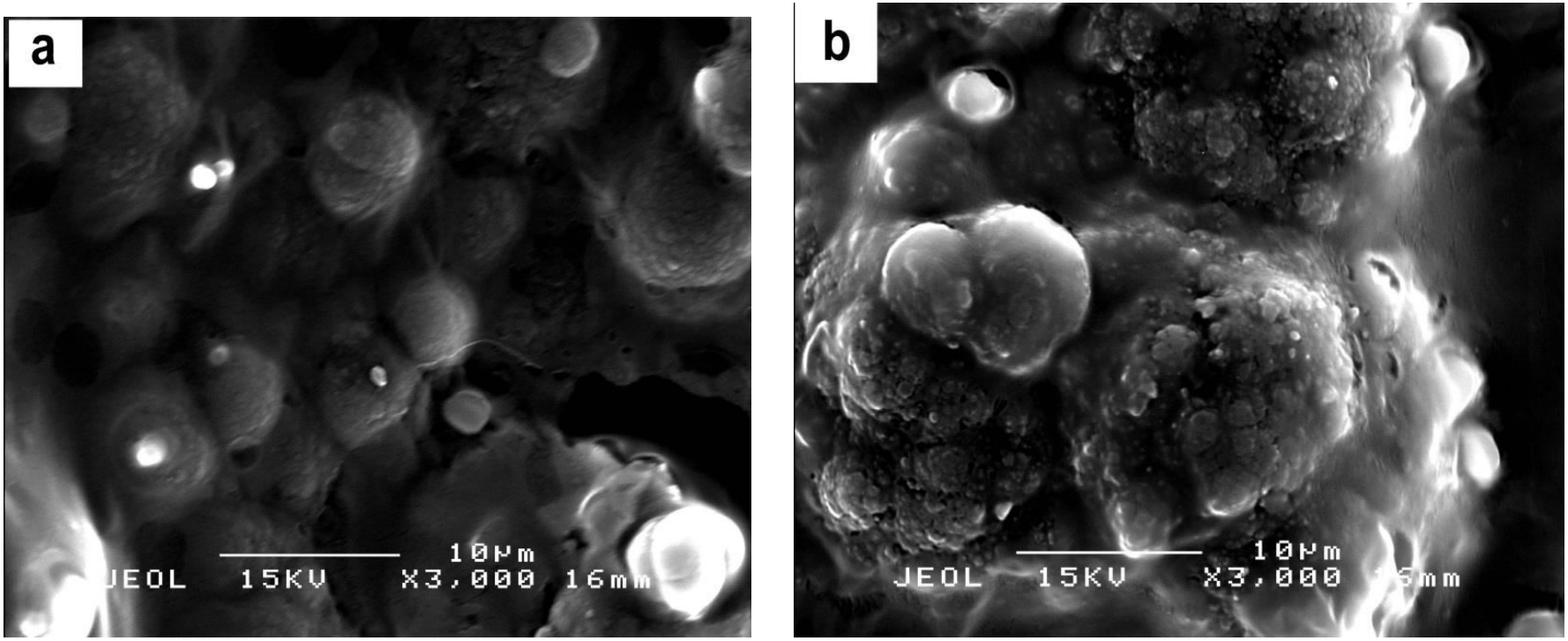


Composite of Polypyrrole-Chitosan (Ppy-CHI) as Sensing area

- Chitosan is a biodegradable, biocompatible, nontoxic and low-cost polymer
- PPy-CHI is a composite of electrochemical polymerization of pyrrole in the presence of chitosan
- Enhance mechanical and electrical properties in the presence chitosan
- Capable for using in sensitive optical sensors helping SPR(surface plasmon resonance) technique

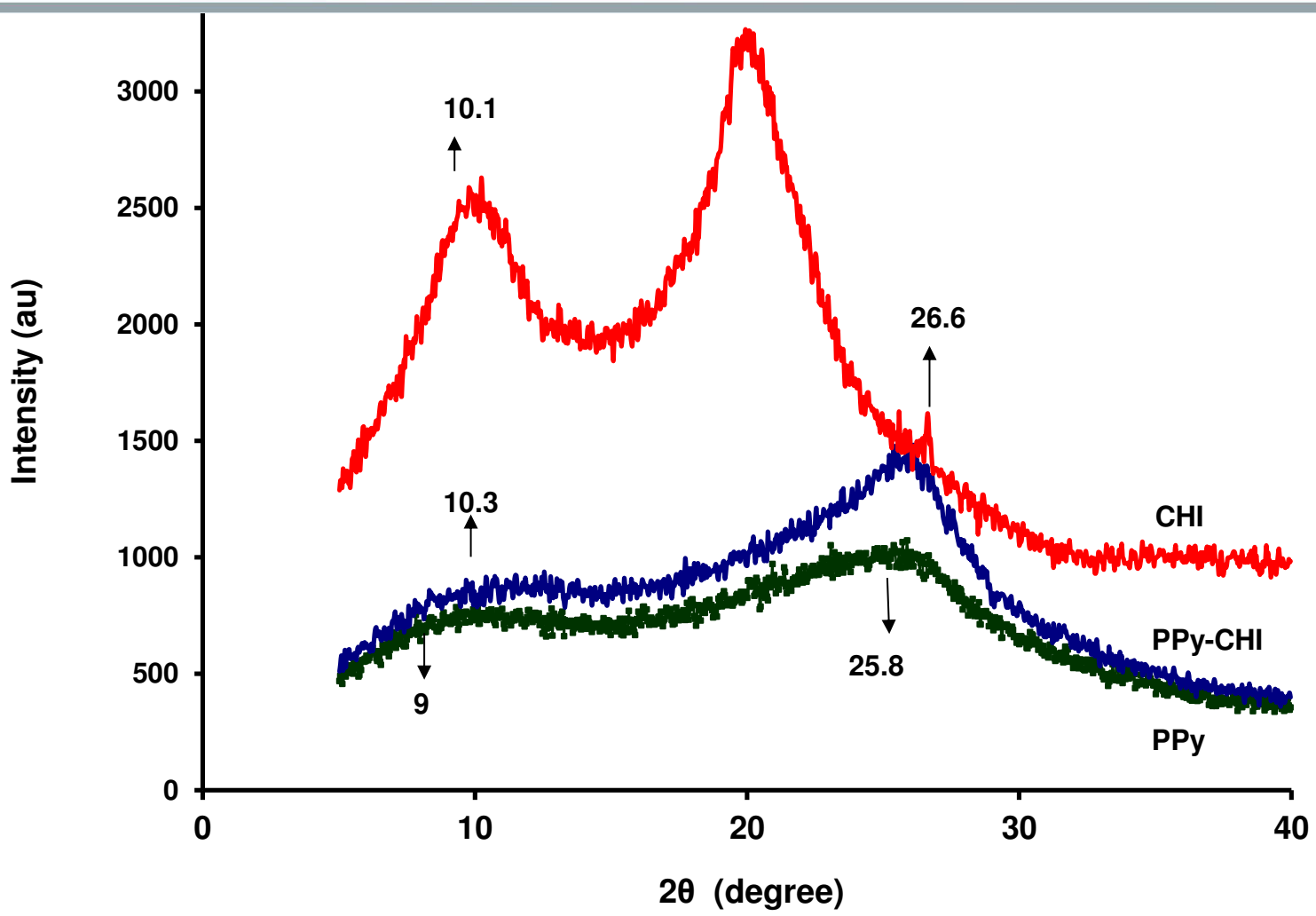
Set-up for electrodeposition of bio-composite films.



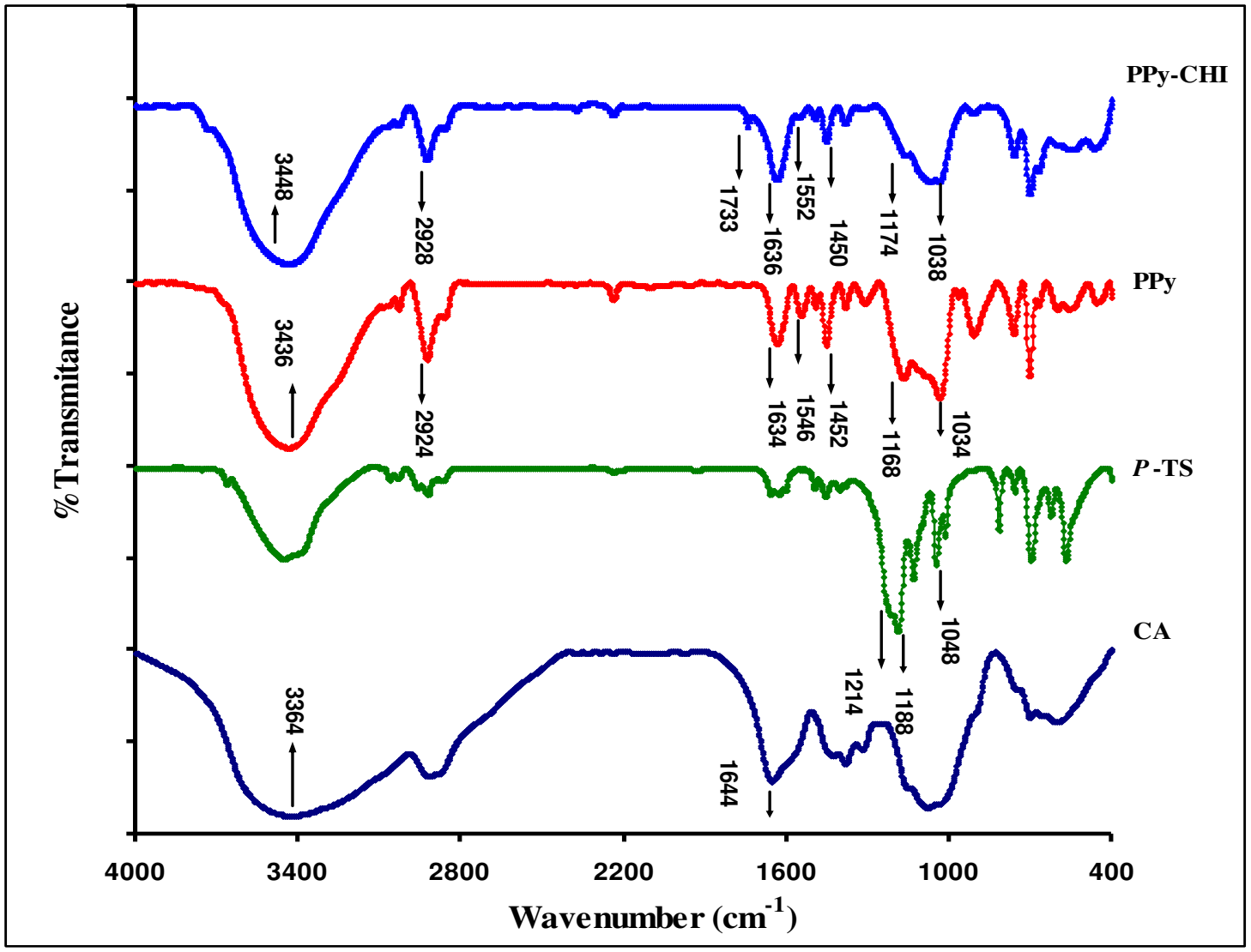


SEM images of the (a) PPy and (b) PPy-CHI (magnification: 3000X)

globular morphology can be observed in PPy. Using CHI to prepare conducting polymer composite leads to agglomeration of the resulting composiote polymer

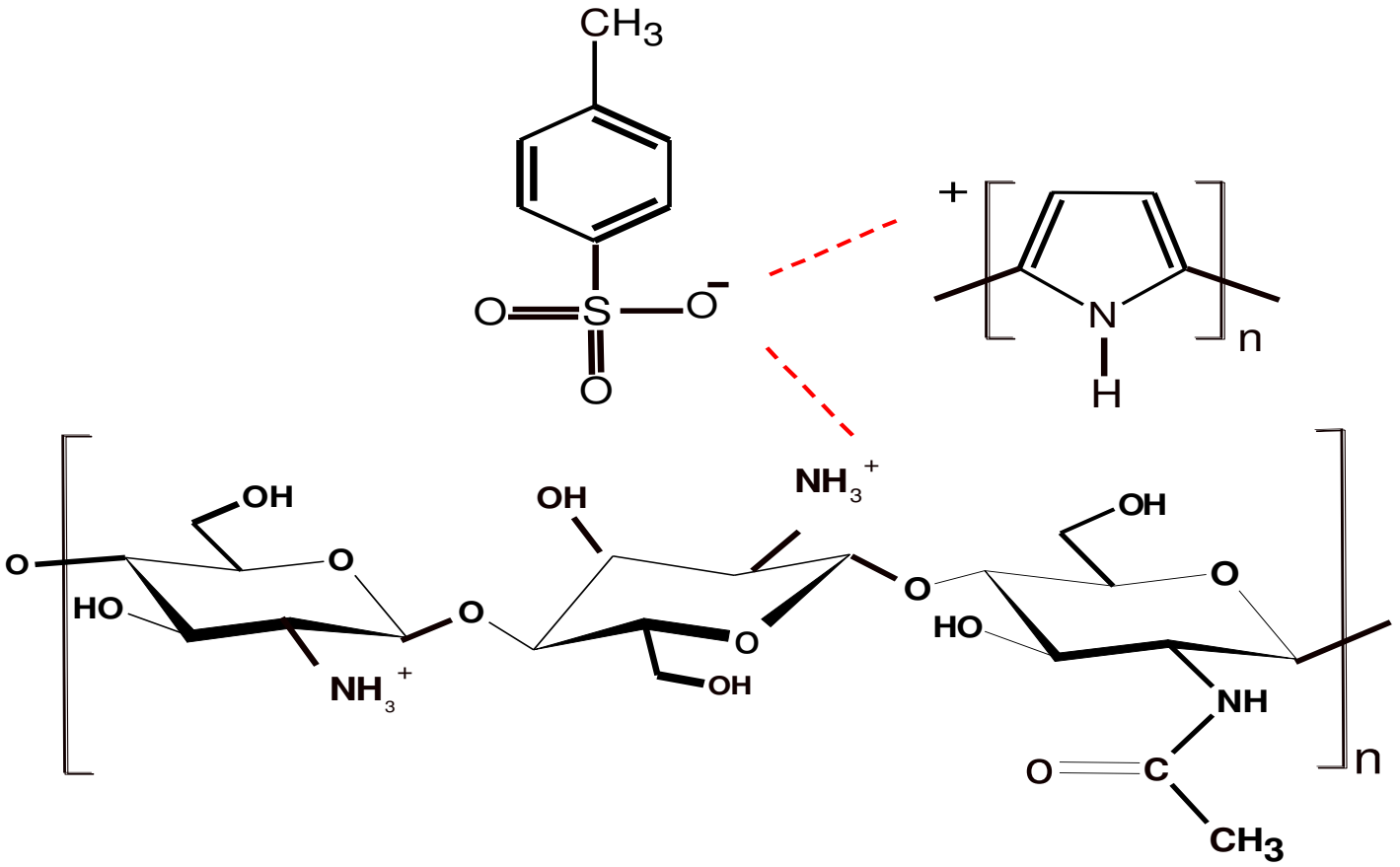


XRD diffractograms of CHI, PPy and PPy-CHI composite films.



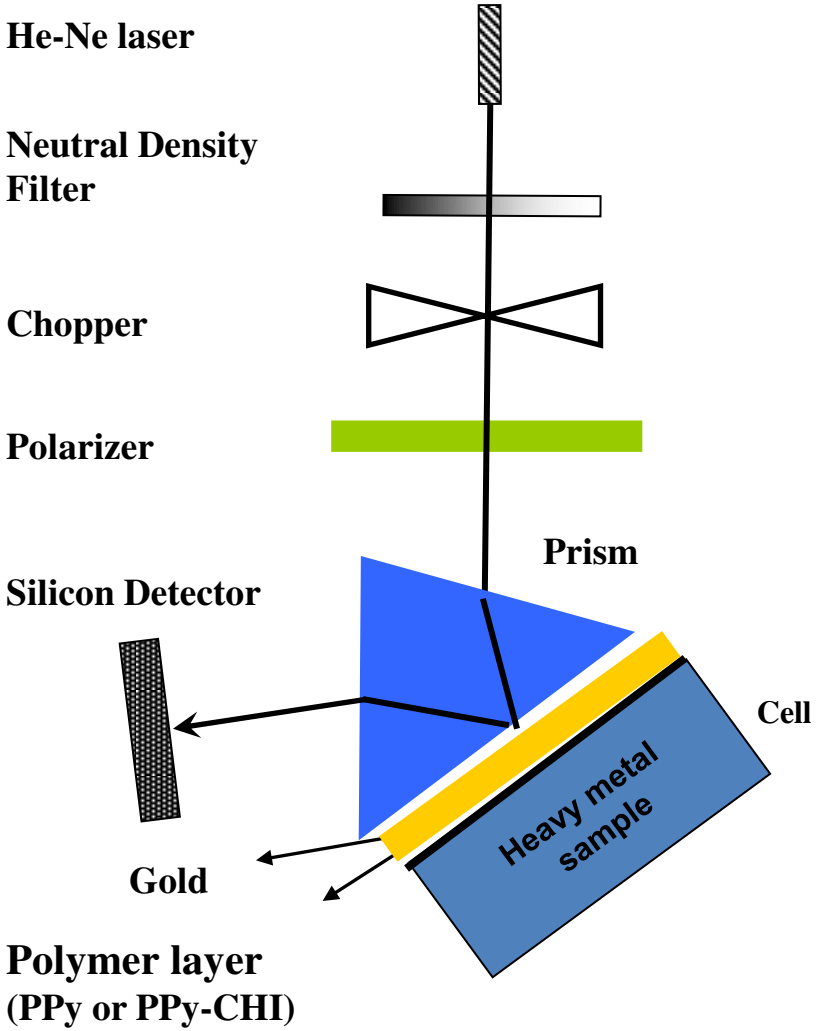
FT-IR spectra of CA (chitosan acetate), *p*-toluene sulfonic acid sodium salt (*p*-TS), PPy (polypyrrole) and PPy-CHI (polypyrrole-chitosan) films.

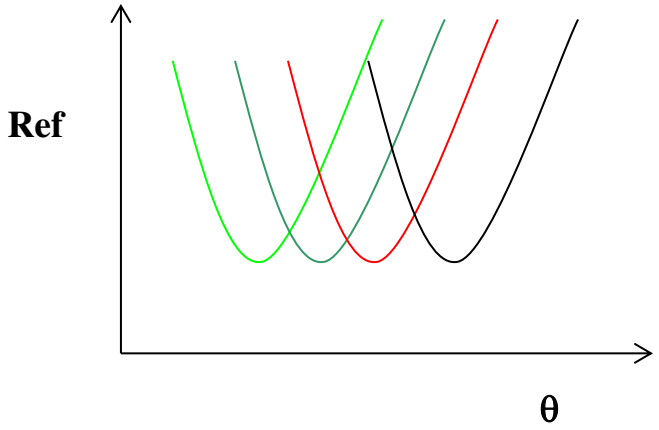
Suggested structure

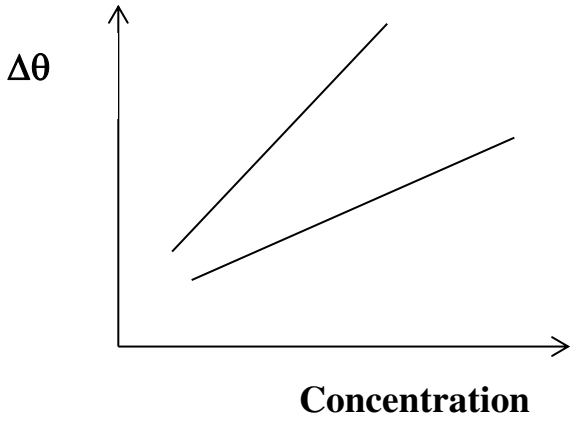


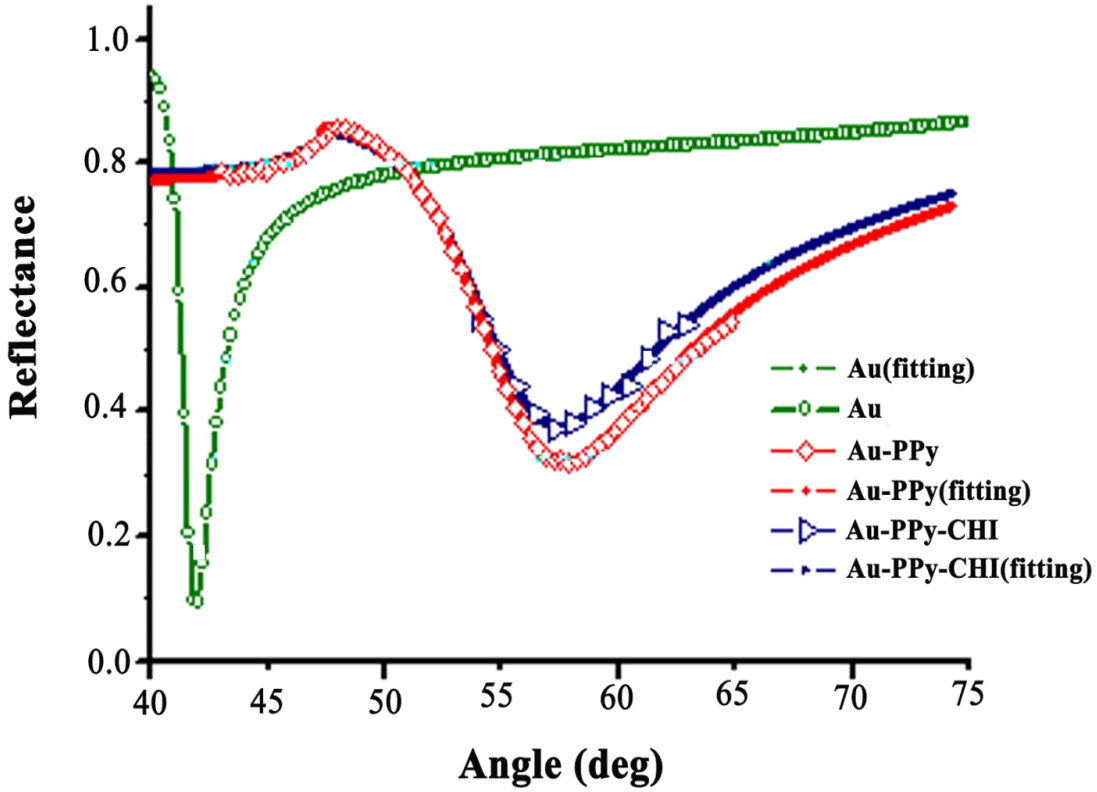
The band at 1174 cm^{-1}: *p*-TS has some interaction with CHI and This interaction caused a longer chain for *p*-TS and subsequently offered higher conductivity for composite film.

Set up configuration for SPR measurements







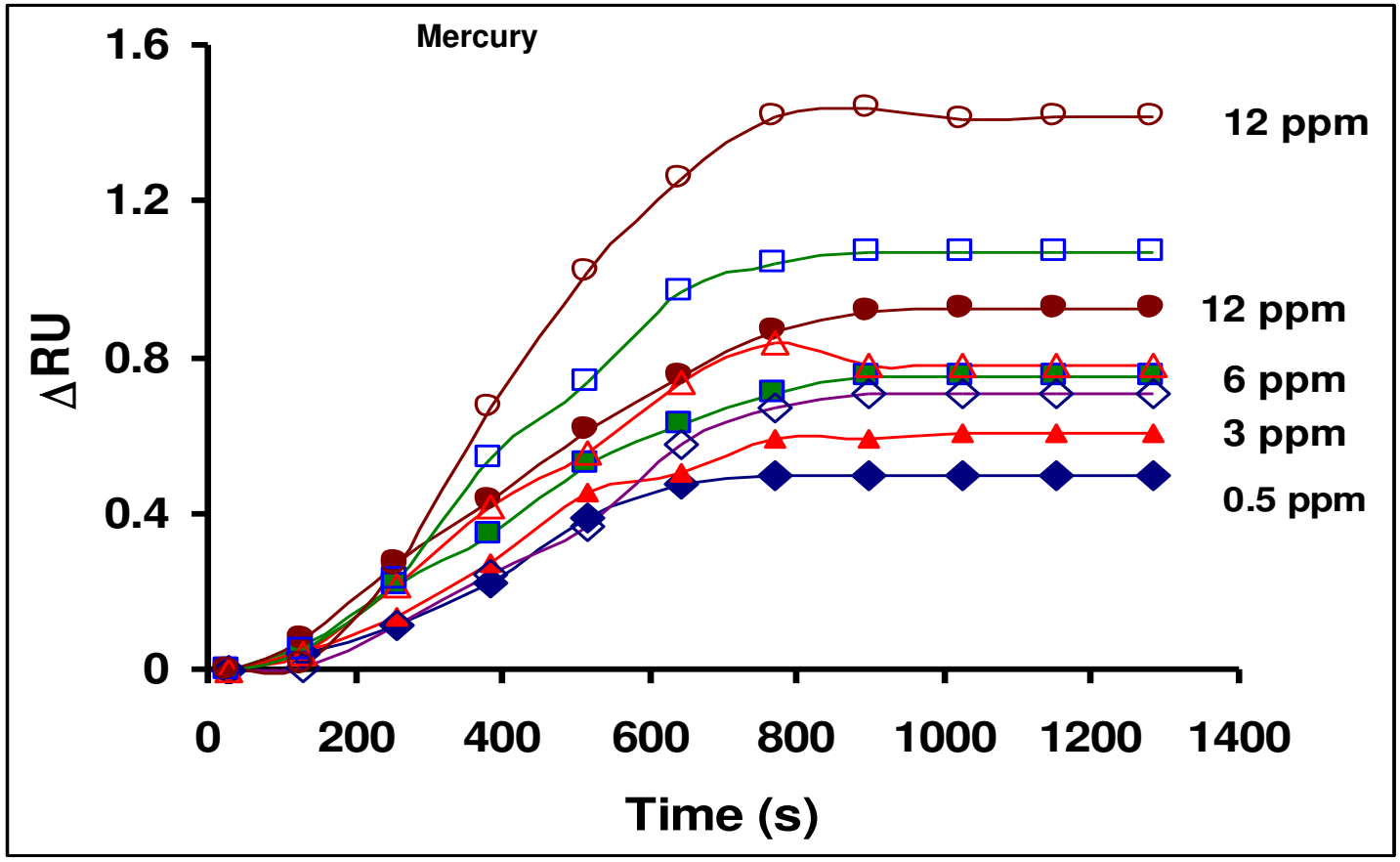


$$n_p \sin\theta = \mathrm{Re}\left[\sqrt{\frac{\varepsilon_d \varepsilon_m}{\varepsilon_d + \varepsilon_m}}\right]$$

PPy	$1.598 + 0.159i$
PPy-CHI	$1.601 + 0.165i$

SPR angular profiles for DDW on the Au, Au-PPy and Au- PPy-CHI surface.

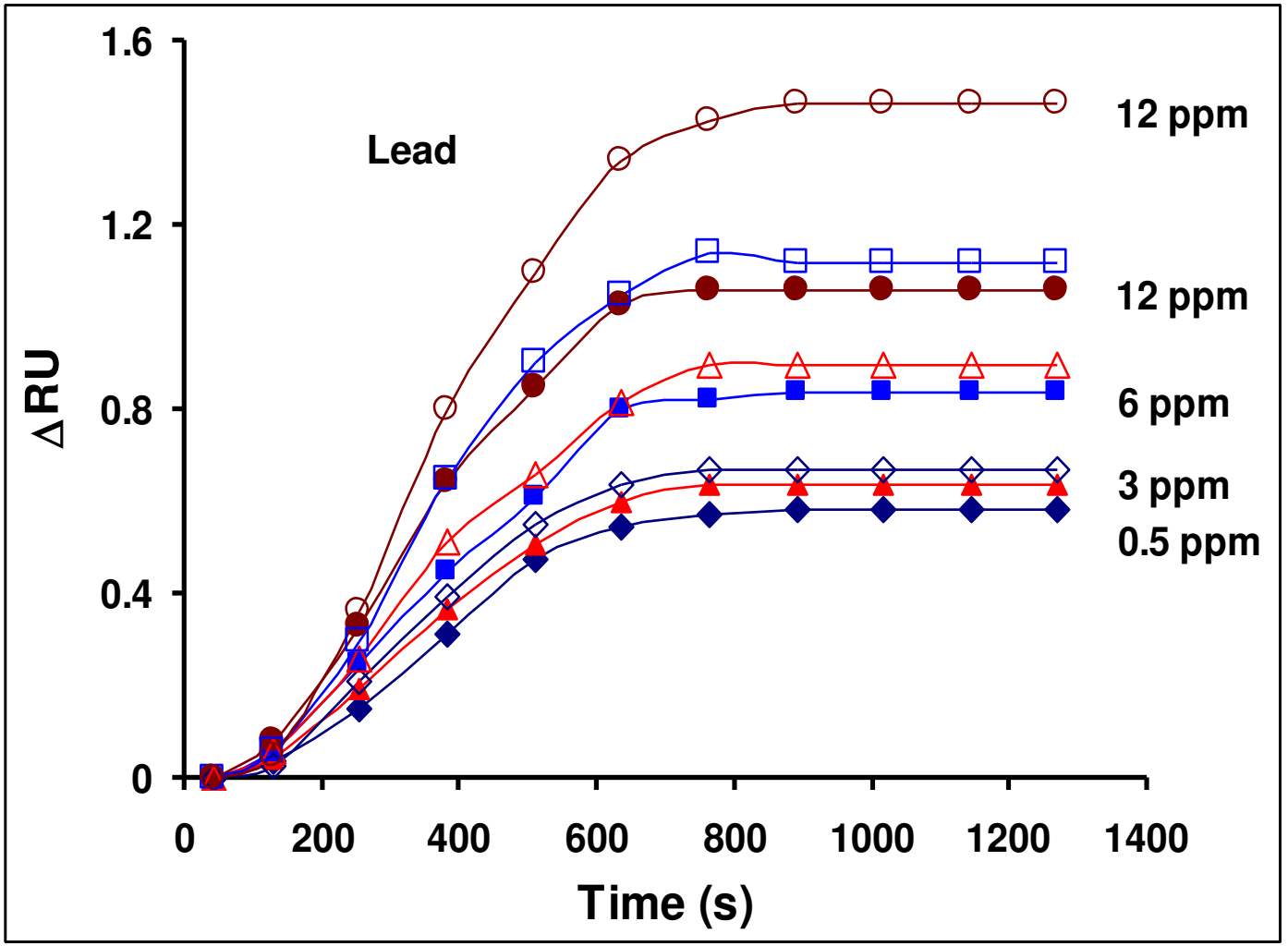
Since the SPR angle shifted clearly to the right and produced a sharp peak of resonance angle, this conducting polymer is capable for using in sensitive optical sensors.



Filled symbols (PPy surface)

Open symbols (PPy-CHI)

The sensograms for 0.5-12 ppm Mercury binding on polymer surface

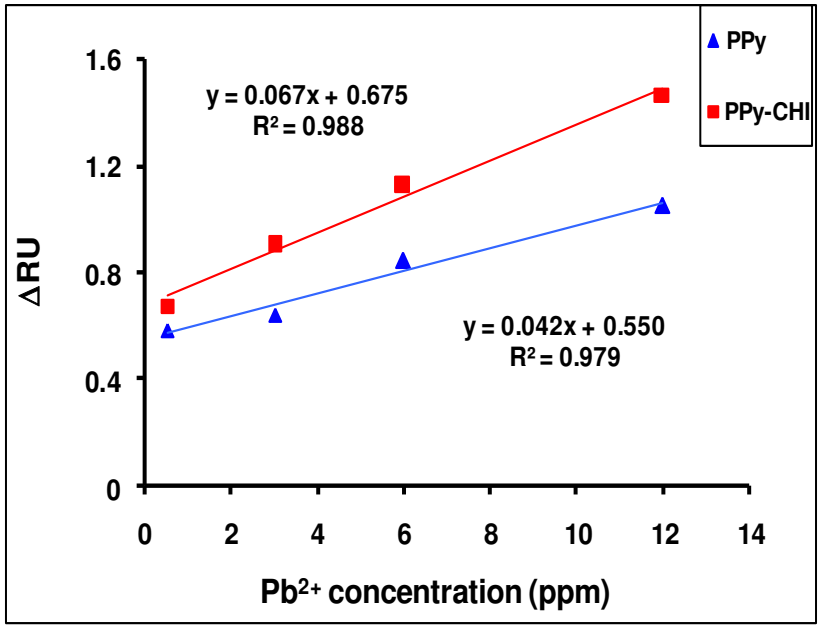


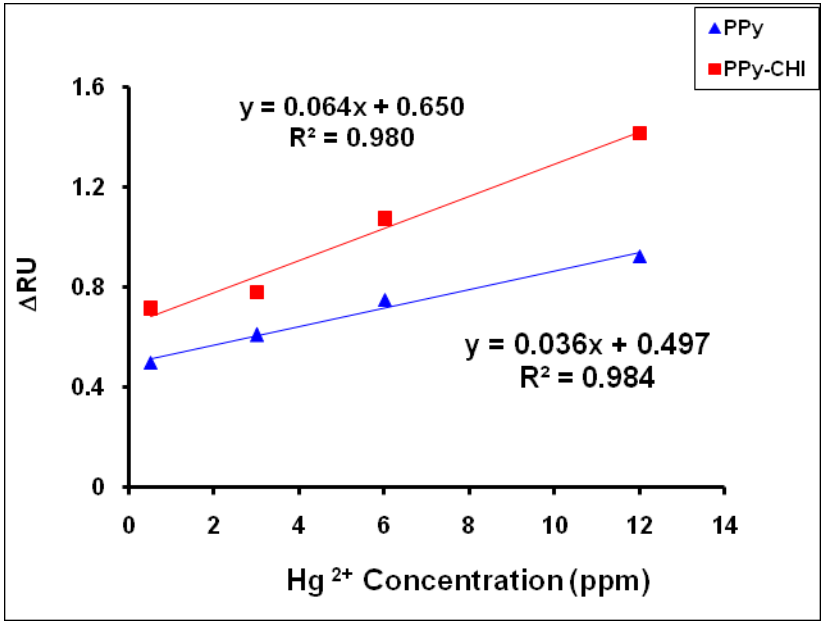
Filled symbols: (PPy surface)

Open symbols: (PPy-CHI)

The sensograms for 0.5-12 ppm lead binding on polymer surface

Standard calibration curves of ions concentration for PPy and PPy-CHI films





Correlation coefficient R is greater than 0.97

Chitosan is used as a sensitivity enhancement agent for detecting the ions, so lower concentrations of ions could be readily detected with less interference.

Both slopes of Pb^{2+} ion are higher than their Hg^{2+} counterparts. Pb^{2+} binds to the polymer film most strongly and the sensors (PPy and PPy-CHI) are more sensitive to Pb^{2+}

Potential Product/ Technology Application(s)

- Detection and measuring the heavy metal in:
- Waste water treatment system of the *factory*
- Metal processing manufactory
  smeltery factories
  battery manufacturers.
- Pollution monitoring laboratory
- Air quality measurment station









Air quality measurment station






Thank you

Let Us Meet Again

We welcome you all to our future conferences of OMICS Group International

Please Visit:

www.omicsgroup.com

www.conferenceseries.com

www.pharmaceuticalconferences.com