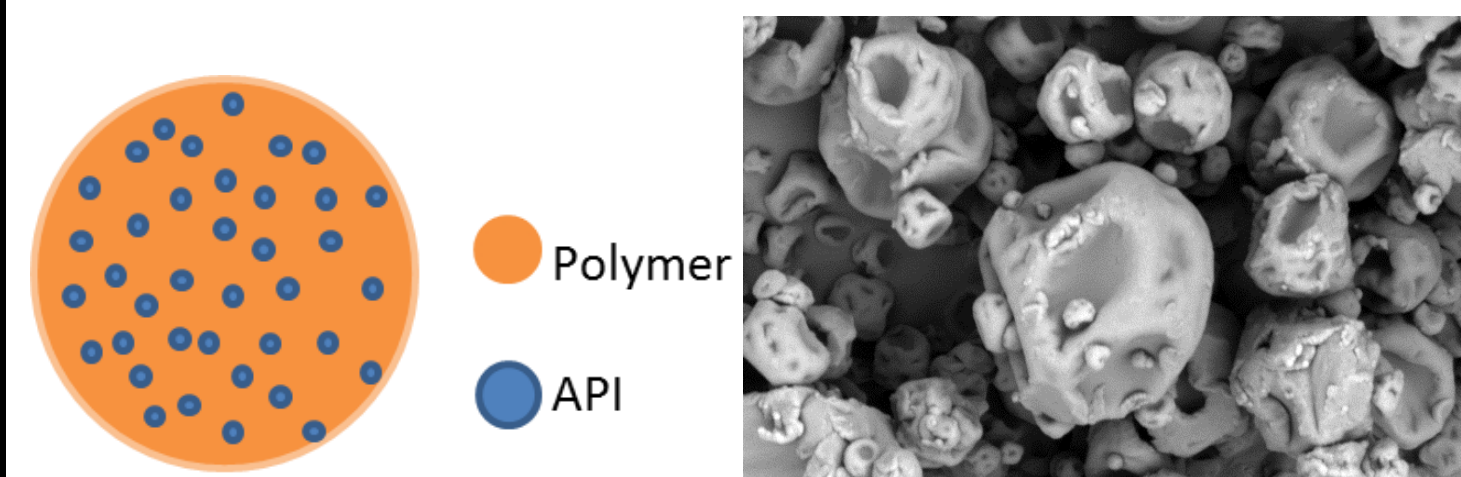
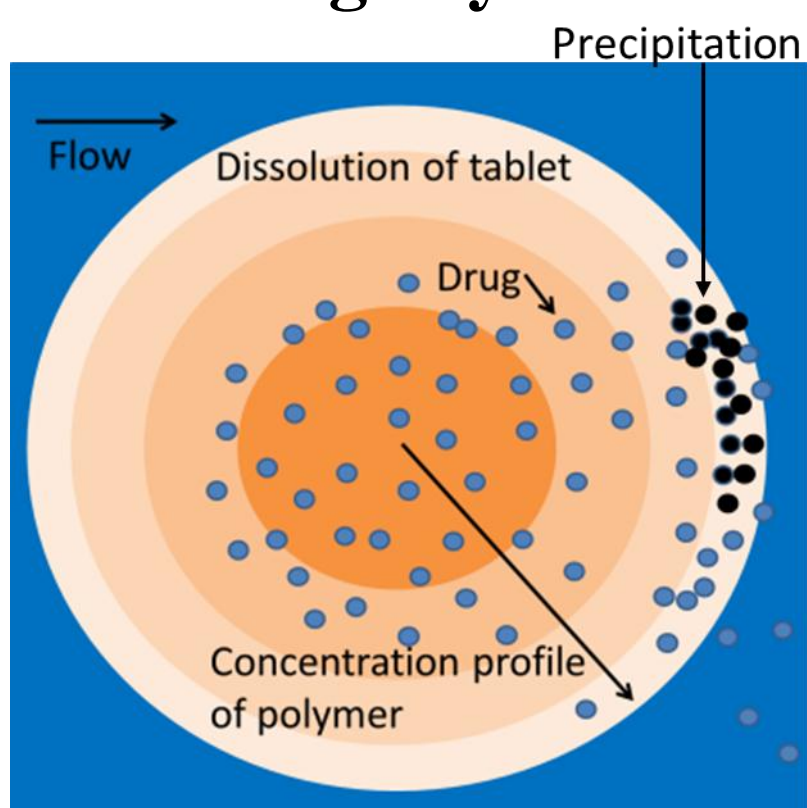


PURPOSE

Selection of suitable polymer matrix to prevent precipitation during dissolution

Modification of API properties
to enhance dissolution rate of API

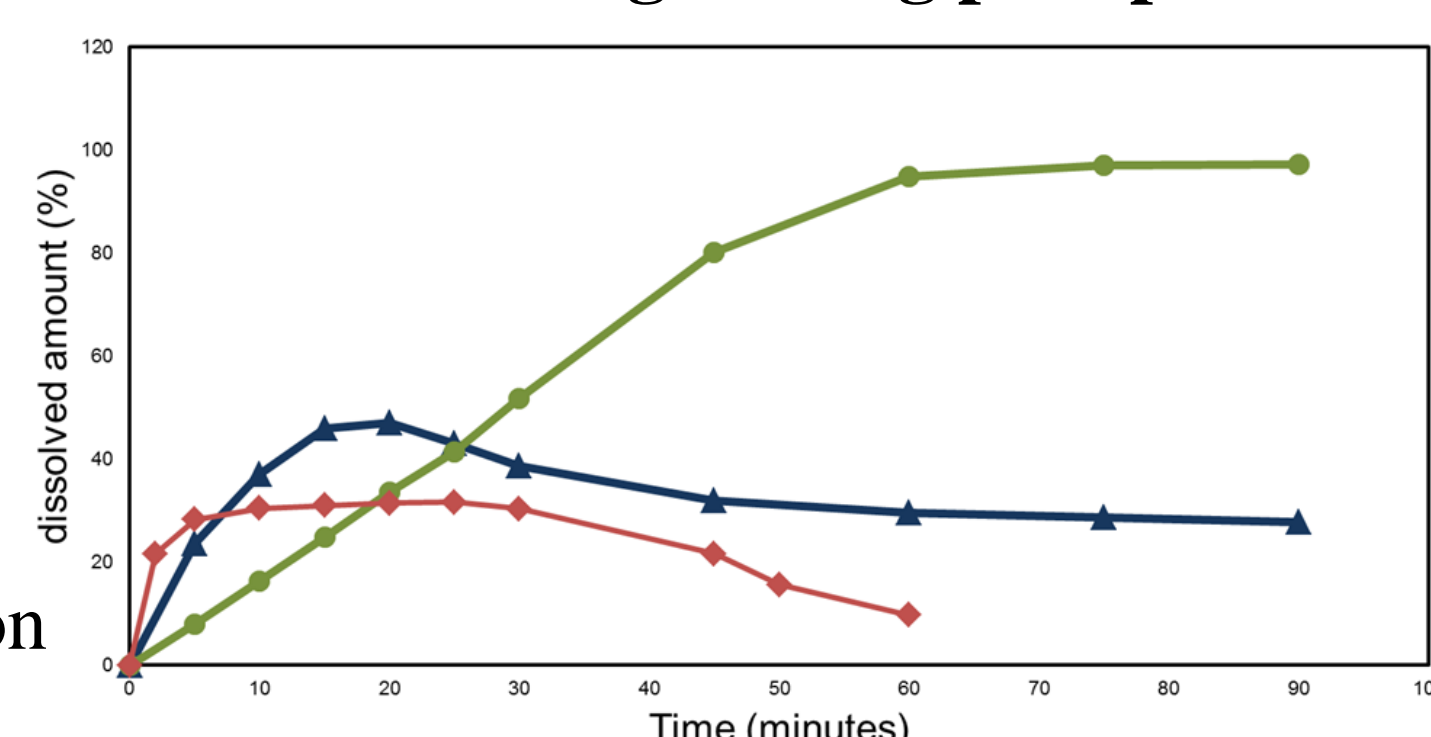
Glass solution prepared by spray drying

Observation of the release of drug from
the dosage by ATR-FTIR Imaging and MRIMechanism of
polymers dissolution

- Swelling
- Gel layer
- Erosion and diffusion front

Effect of additives

Understanding of drug precipitation



What is the cause? When? Where?

IMAGING METHODS

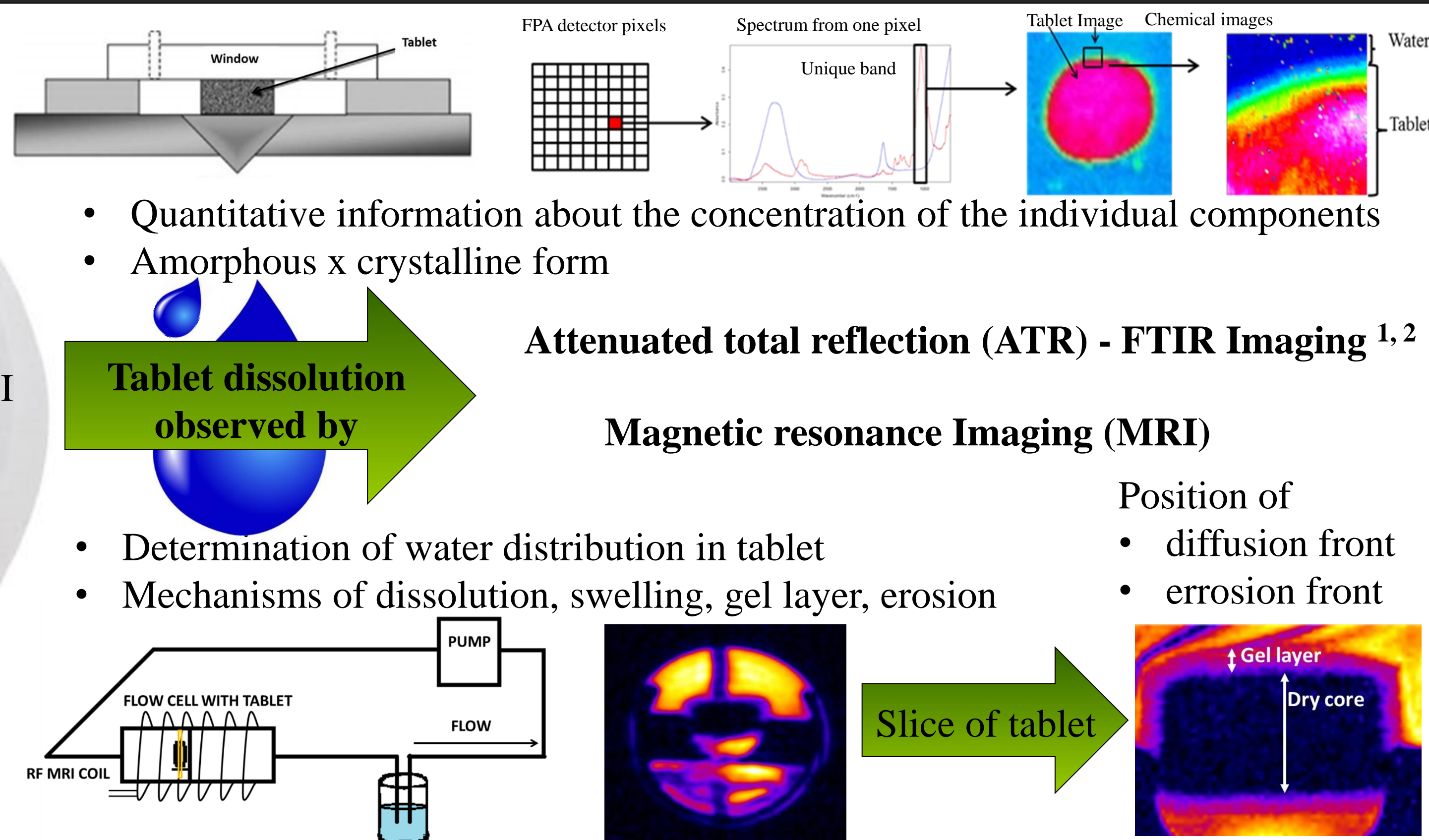
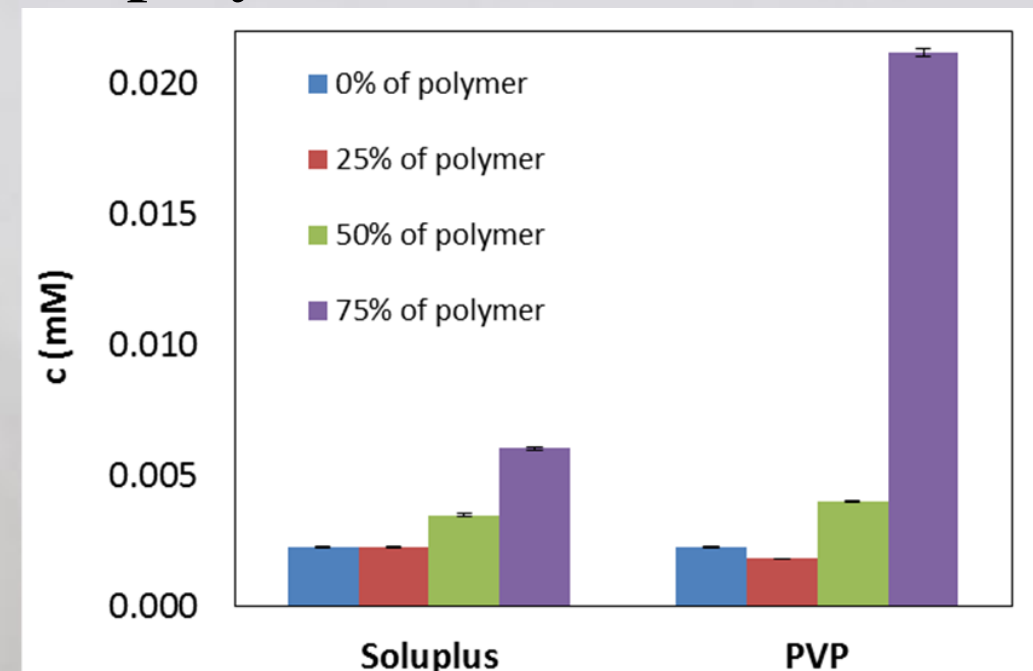
Glass solution

Poorly soluble drug
dispersed in polymer matrix

- Soluplus
- PVP

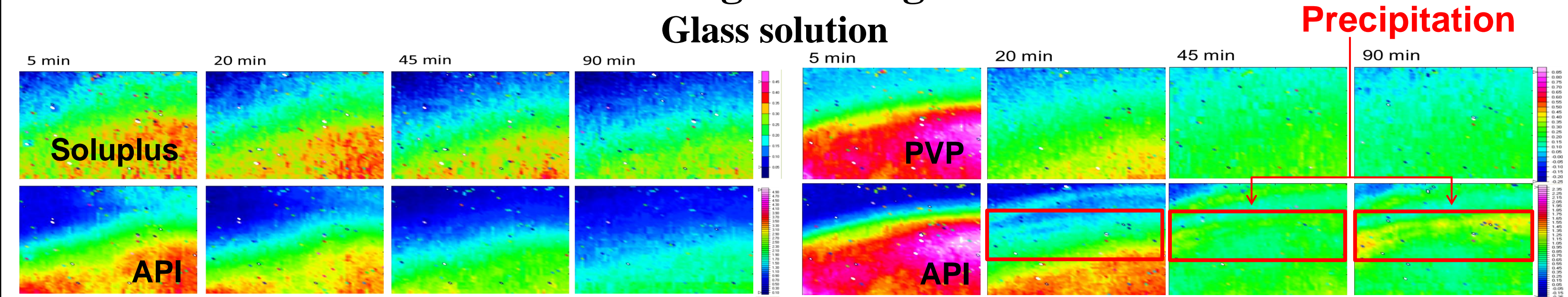
Ratio 1:3 (drug:polymer)

Effect of polymers on kinetic solubility of API

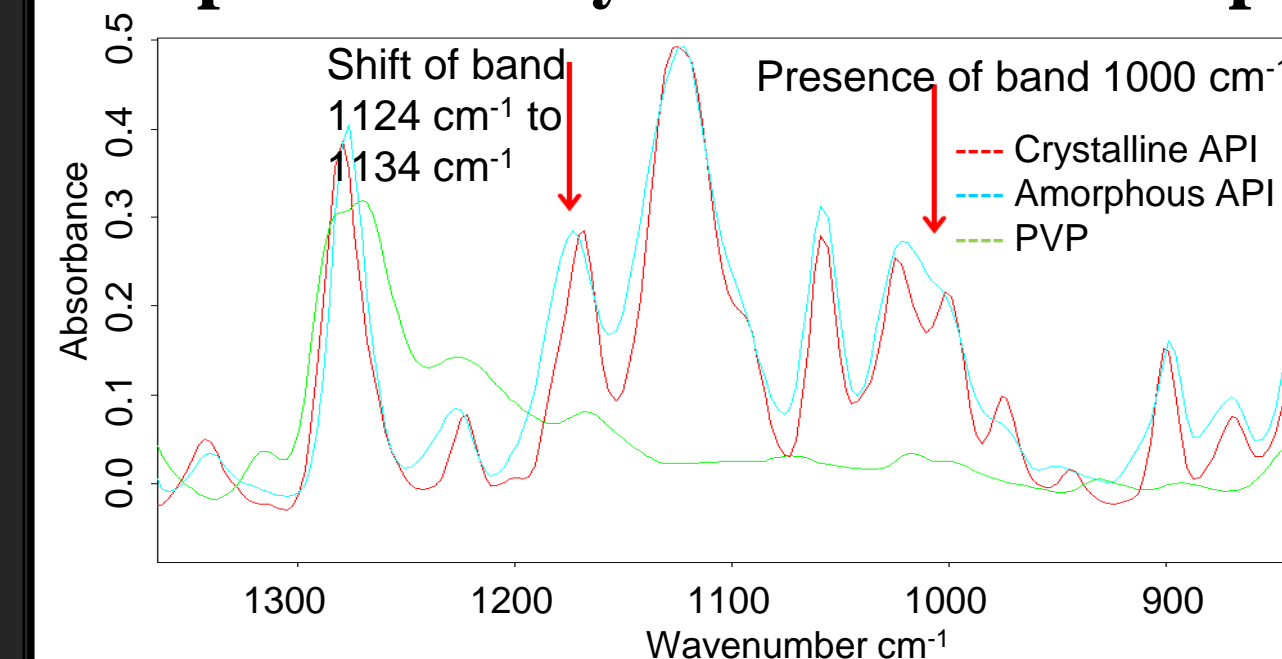


ATR-FTIR imaging recognizes crystallization in glass solution systems

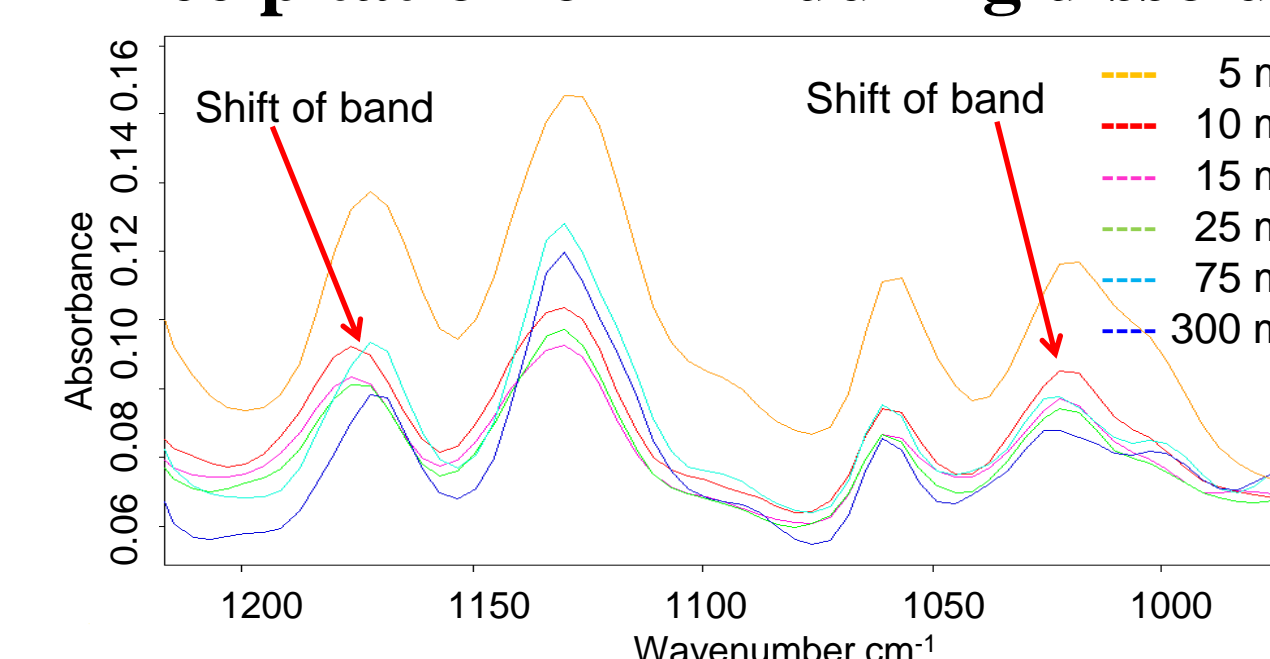
Absorbance images during dissolution

Slow dissolution of Soluplus
Gradually dissolving APINo
precipitationFast dissolution of PVP
Fast dissolving APIPrecipitation of API
Local supersaturation

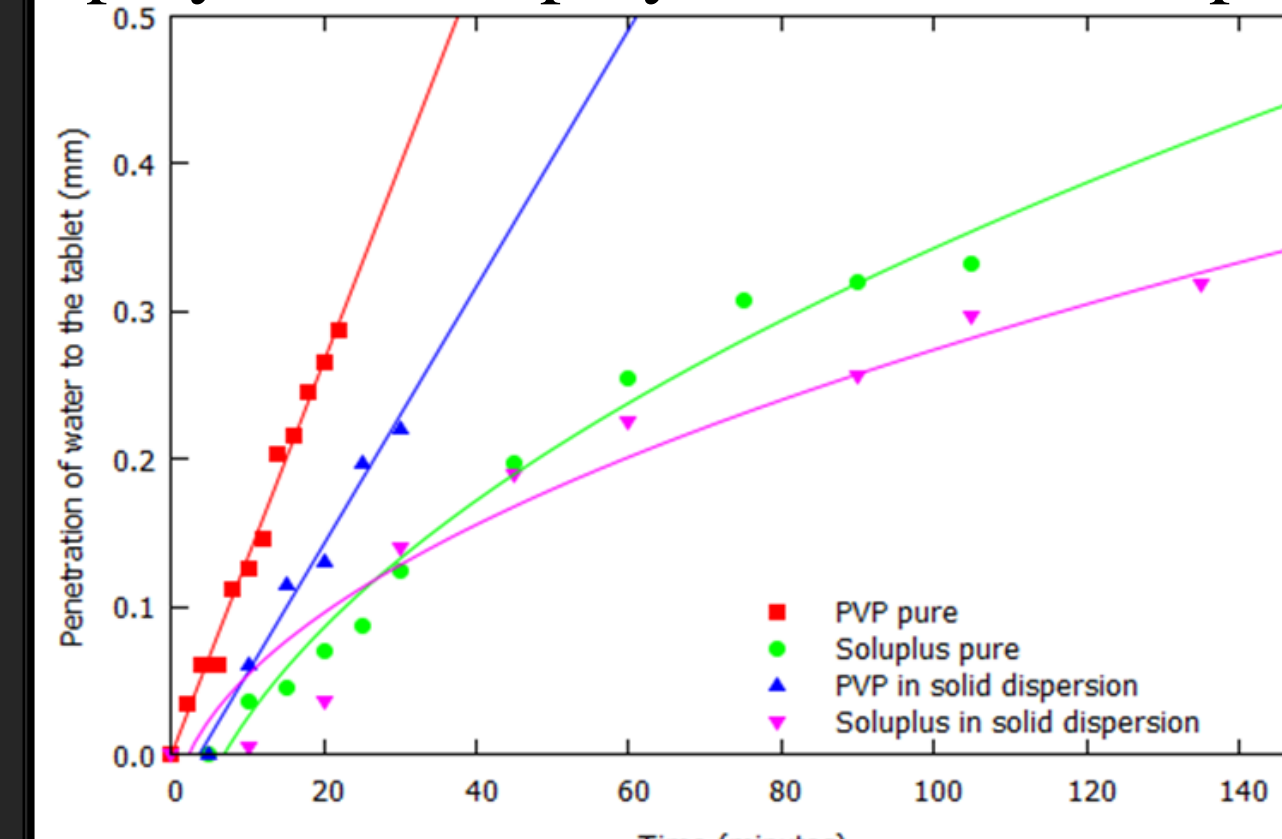
IR spectra of crystalline and amorphous API

Conformation of
crystalline form of
API after
precipitation

Precipitation of API during dissolution



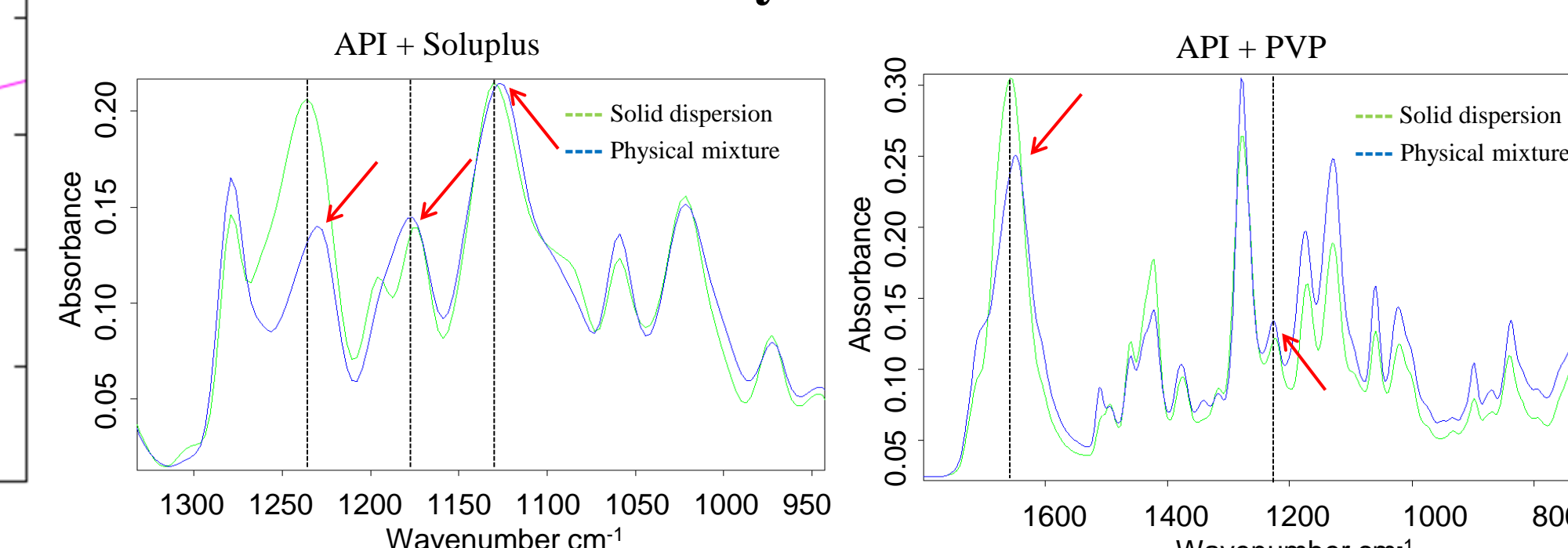
Position of diffusion front

Different water penetration rate for pure
polymers and polymers in solid dispersion

Presence of the poorly water-soluble drug

Worse wetting properties

Interactions of API-polymer in the glass solution

API-Polymer interactions³

CONCLUSIONS

The application of methods (ATR-FTIR Imaging, MRI):

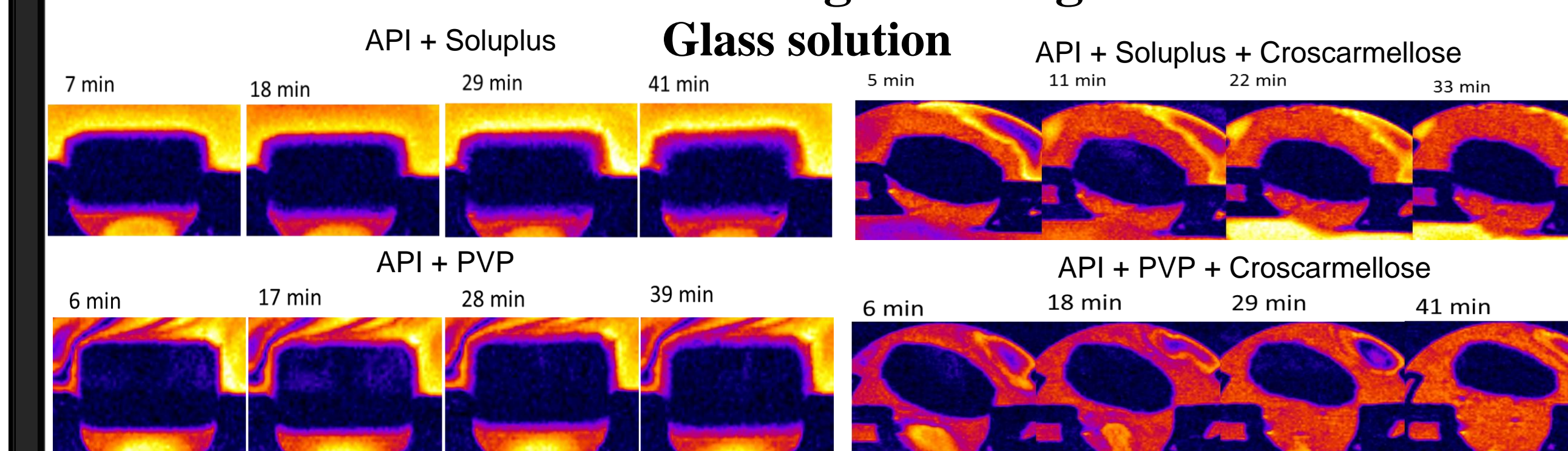
- Effect of polymers on releases of API
- Identification of precipitation (limitation of unique bands presence)
- PVP fast dissolution
- Local precipitation of API with PVP
- Soluplus release API gradually



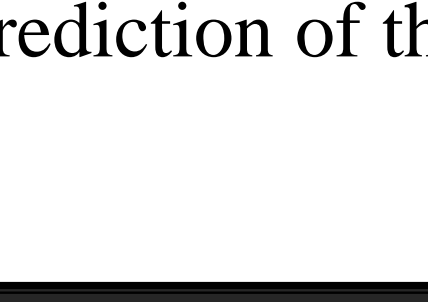
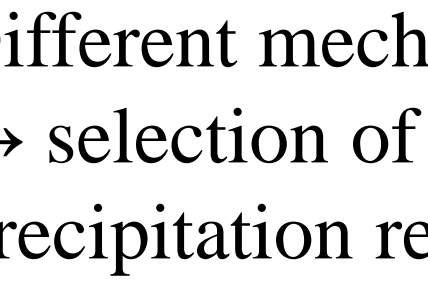
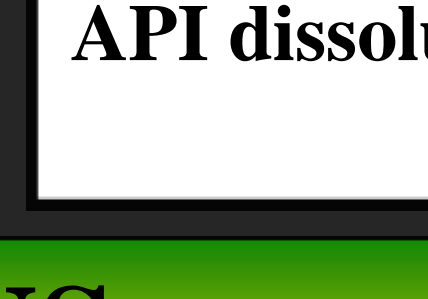
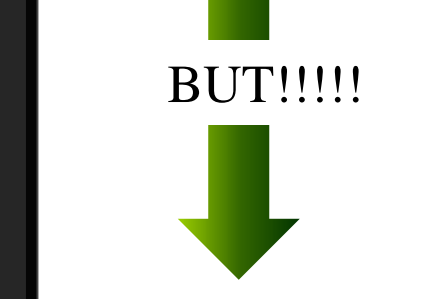
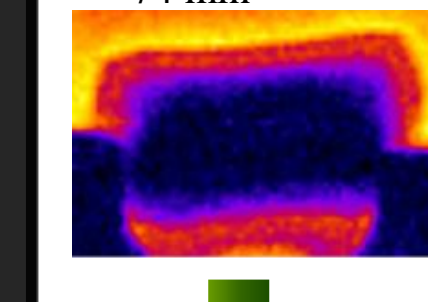
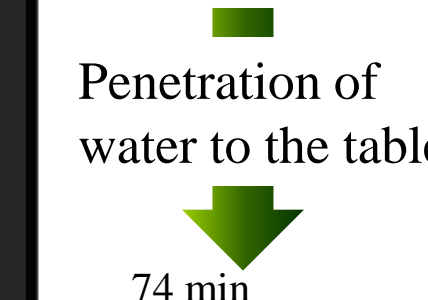
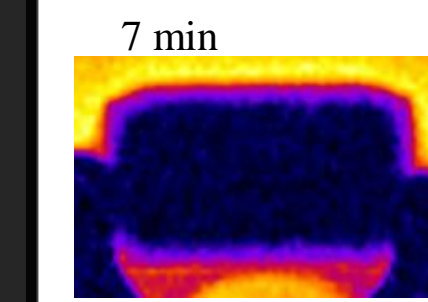
Selection of suitable polymers during screening → prevent precipitation

Dissolution of tablets by MRI

Water distribution images during dissolution

Similar water penetration
rate

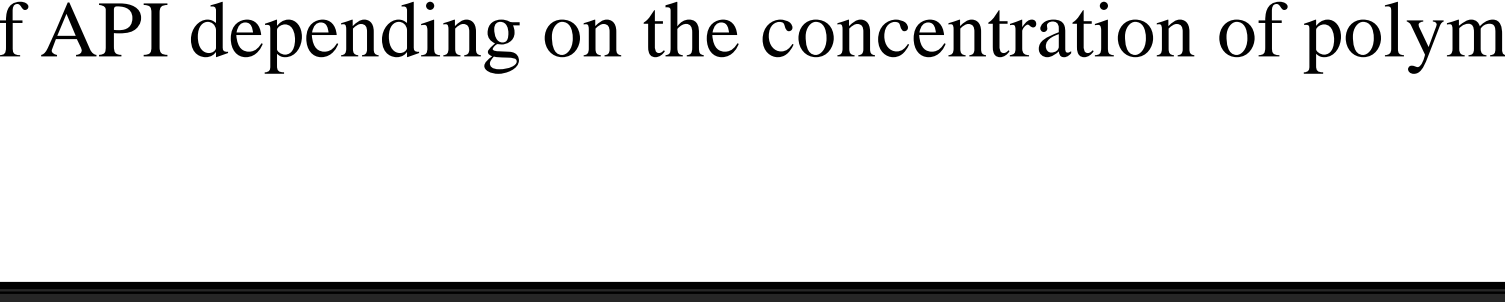
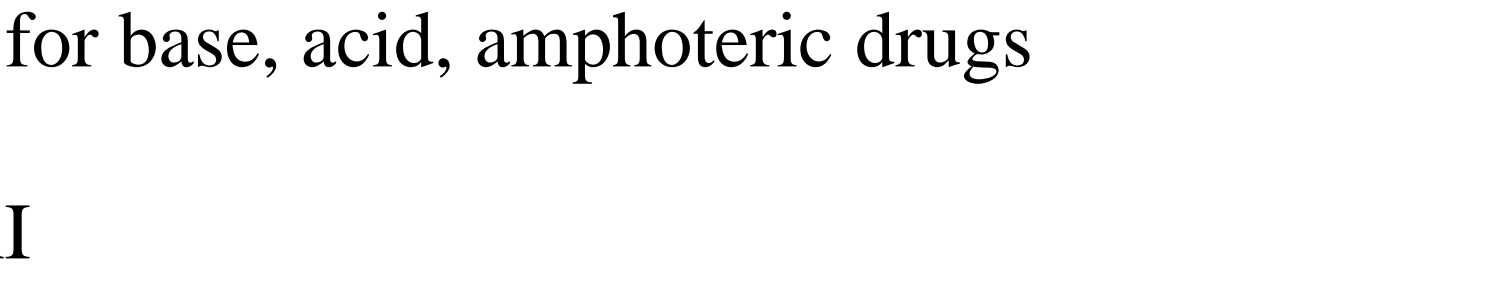
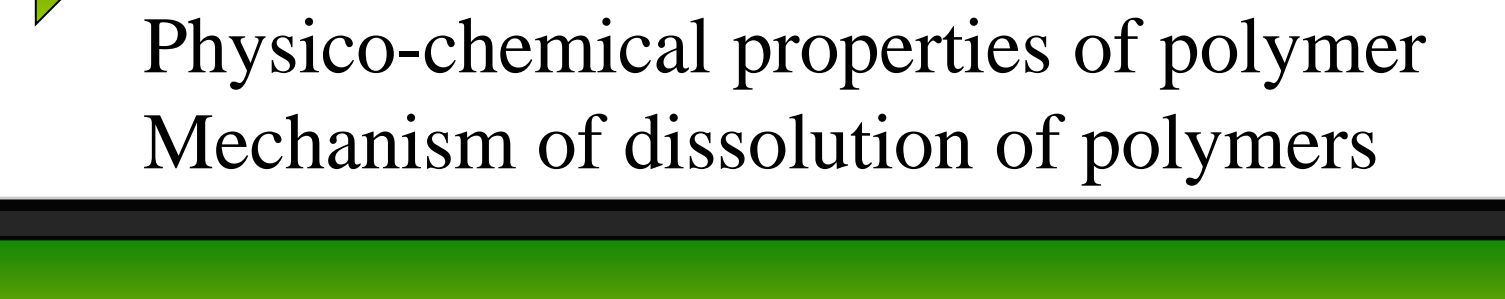
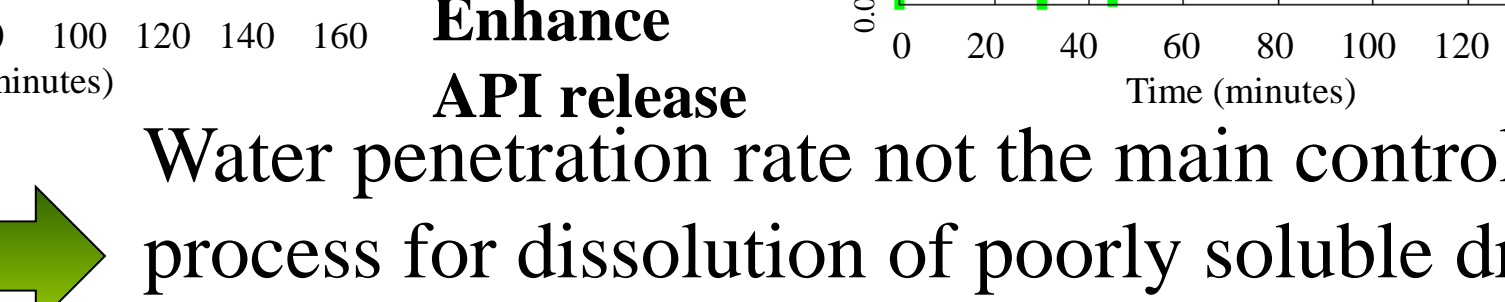
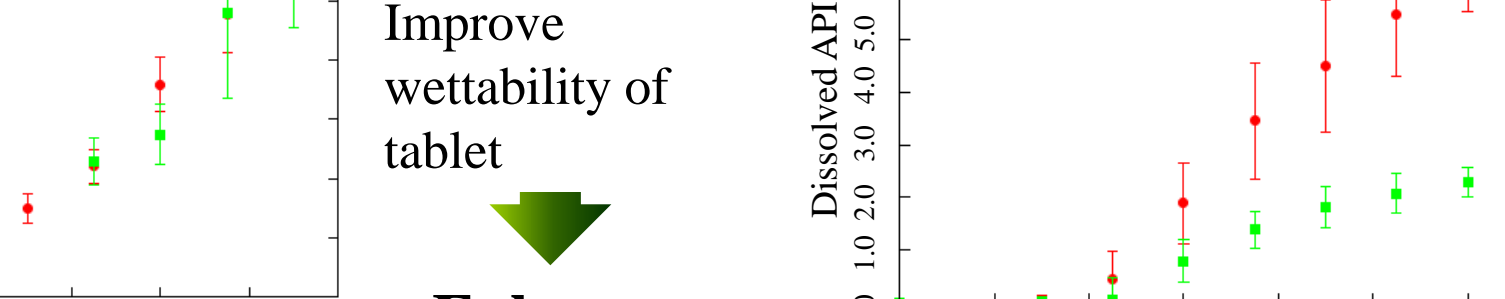
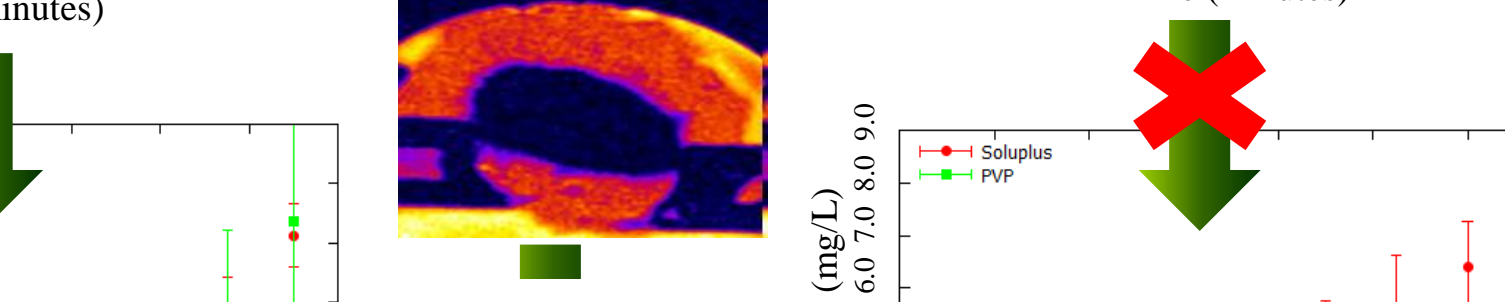
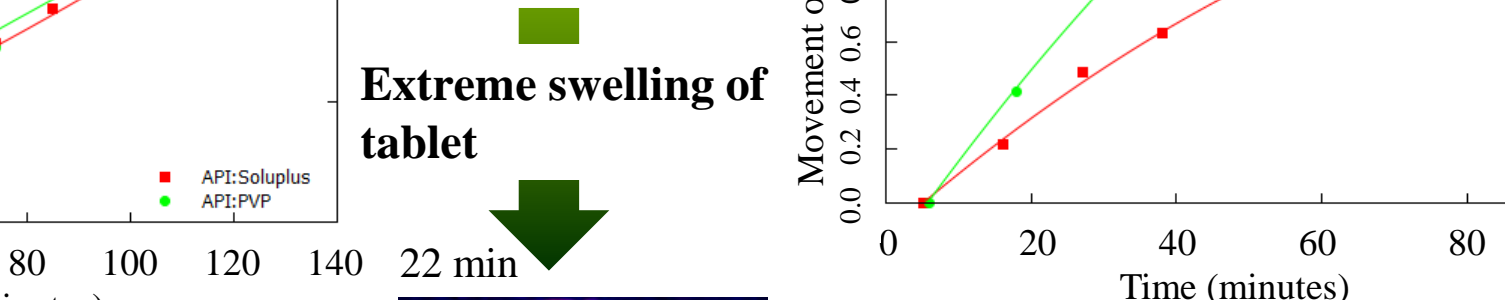
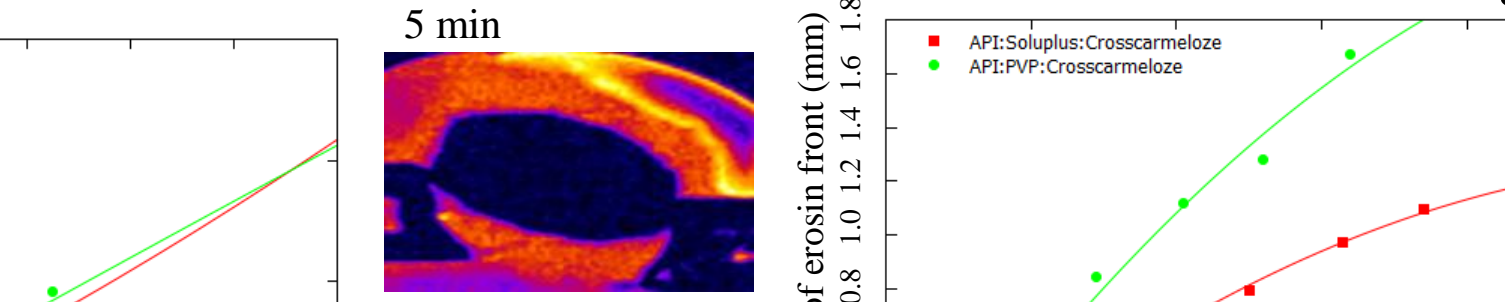
No swelling, small erosion



Presence of disintegrant

Different water
penetration rate

Extreme swelling



FUNDING/GRANTS/ENCORE REFERENCE

References:

- ¹ Kazarian S.G., Chan K. L. A., Macromolecules, 2003, 36, 9866-9872.
 - ² Kazarian S.G., Ewing A. V., Expert Opin. Drug Deliv., 2013, 10(9), 1207-1221.
 - ³ Punčochová K., Heng J., Beránek J., Štěpánek F., International Journal of Pharmaceutics, 2014, 469 (1), 159-167.
- Financial support from the Specific University Research (MSMT 2013/2014) is gratefully acknowledged.

Future plans

- Different mechanism of release for base, acid, amphoteric drugs → selection of polymers
- Precipitation recognized by MRI
- Prediction of the precipitation of API depending on the concentration of polymer