



Ovomucin shares the gelling property of gum

Marina Offengenden and Jianping Wu

Background

Proteins and polysaccharides have many applications in foods, cosmetics and pharmaceuticals.

They act as thickeners, gelling, coating and emulsifying agents.



• Proteins

- Food gels: Yogurt, cheese, pudding, sausage, jelli, tofu¹

• Polysaccharides²

- Gelling agents: κ-carageenan (pudding), gellan gum (jellies)
- Thickeners and stabilizers: Xanthan gum³ – viscosity decreases with shear. Used in salad dressings and ketchup: easily mixed, pumped and poured. Also used in soups, gravies and in frozen foods to improve stability.

Ovomucin is a glycoprotein in egg whites.

- Responsible for giving the egg white its thick, gel like texture.
- Composed of both protein and carbohydrates.
- Can form a gel at room temperature without additives.

Project goals

1. To determine the properties (flow, microstructure) of gels prepared from ovomucin and evaluate its potential uses.
2. To determine the influence of salt and charge on the gel.

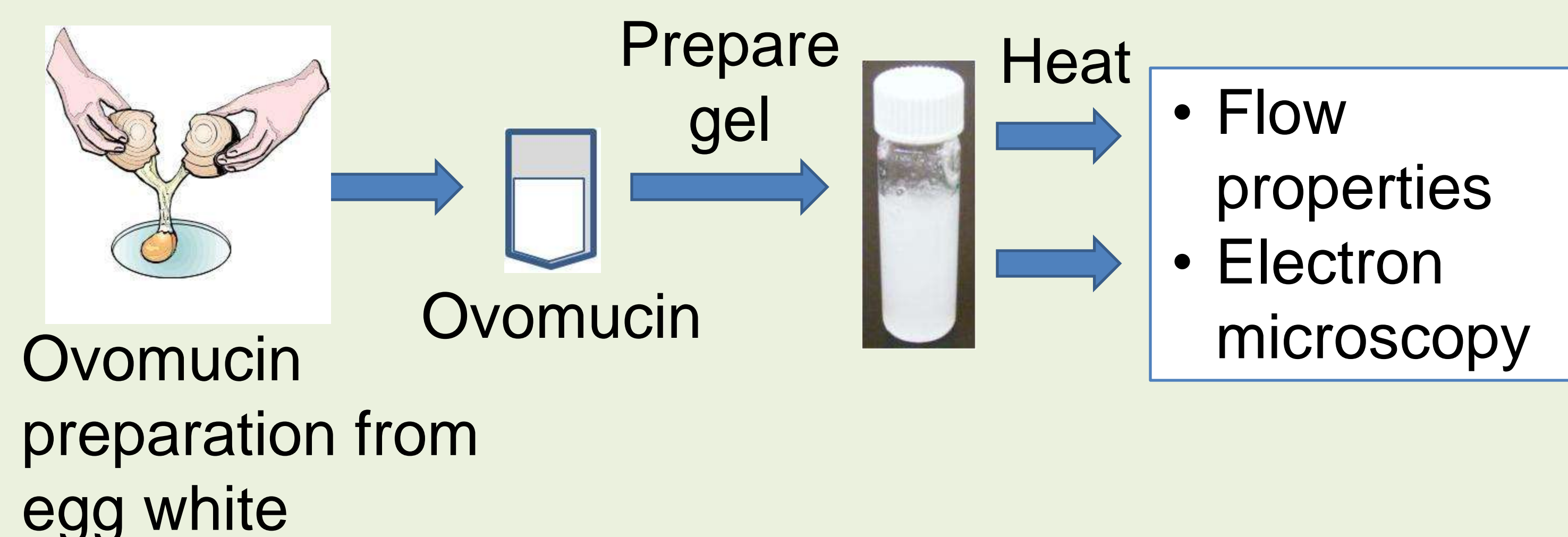
References:

1. Matsumura, Y., Mori, T. (1996) Gelation. In G.M. Hall (ed.), Methods of testing protein functionality.
2. Saha, D., Bhattacharaya, S. (2010) J Food Sci Technol 47(6):587-597
3. Katzbauer, B. (1998) Polymer degradation and Stability 59: 81-84

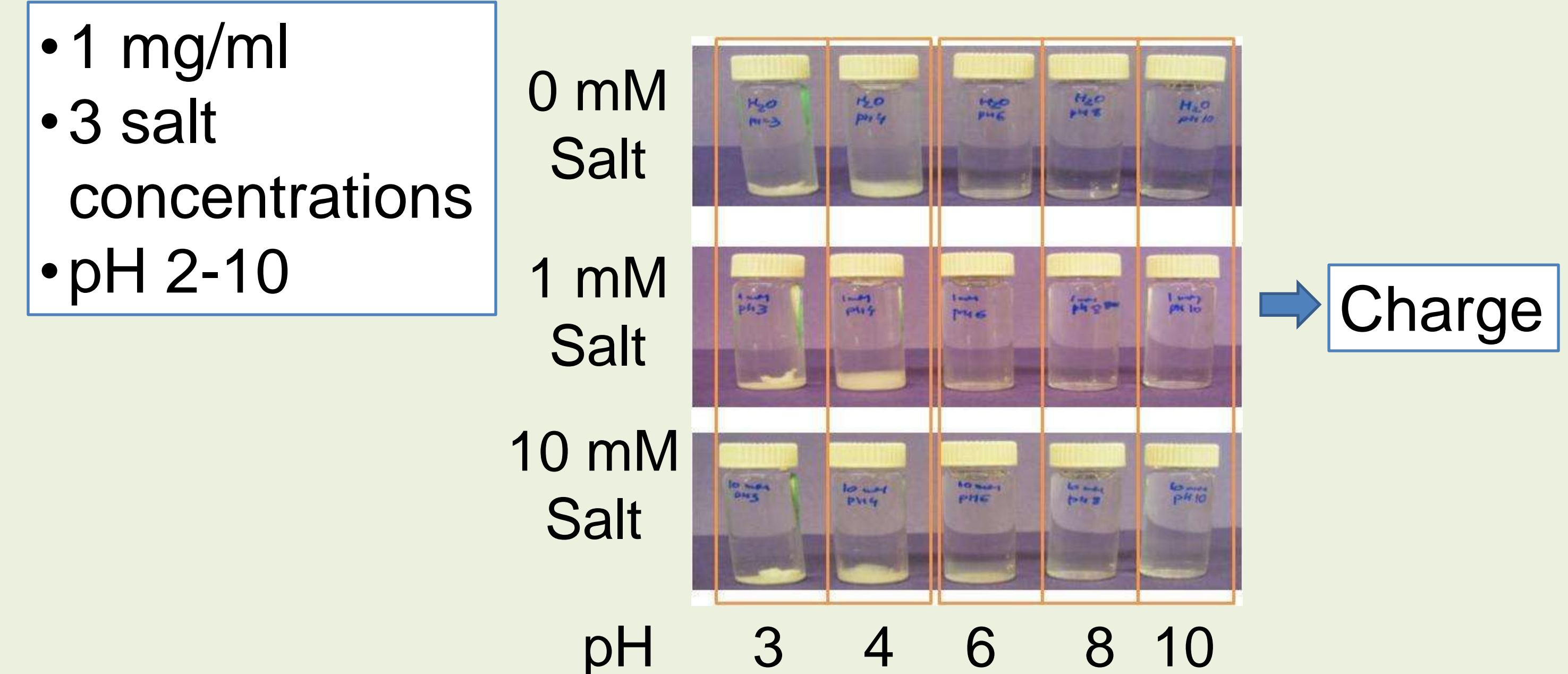
The experiment

1. Influence of salt on gel structure and properties

- 10 mg/ml
- 3 salt concentrations: 0, 1 and 10 mM salt



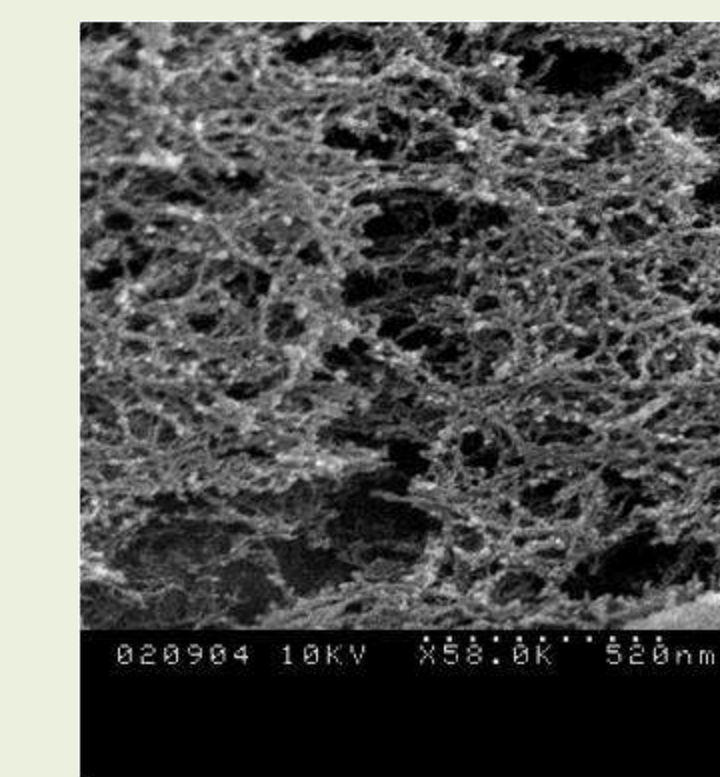
2. Influence of salt and pH on ovomucin charge



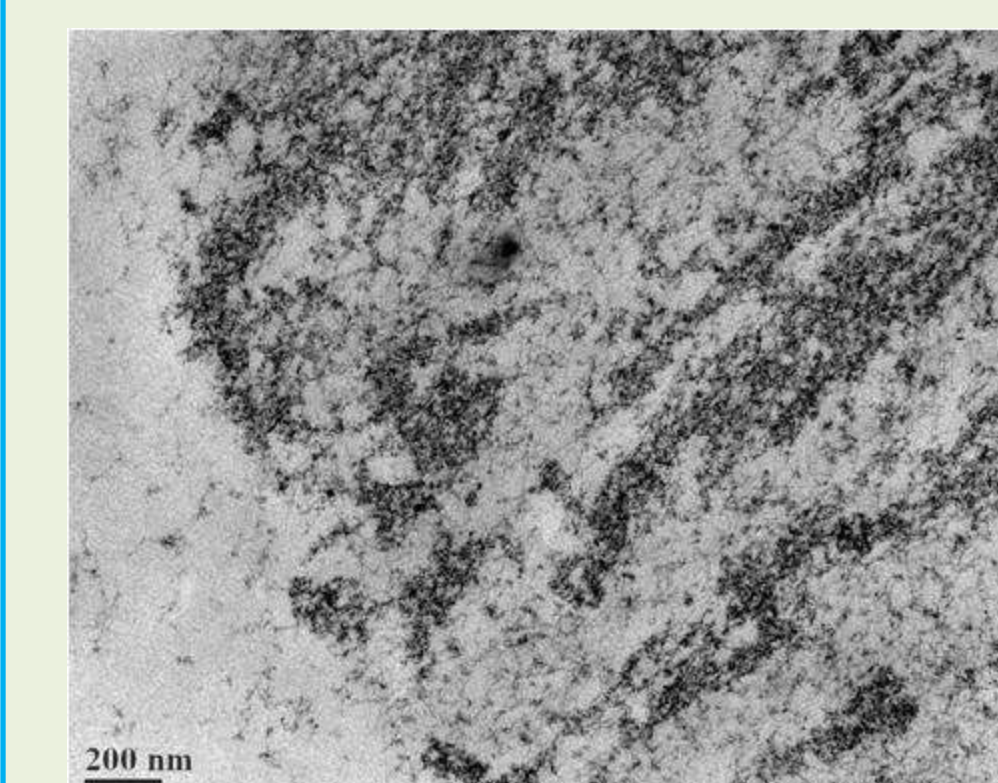
Our conclusions

- Ovomucin gel is a “weak gel”, similar to other polysaccharide gels (xanthan gum).
- Flow properties of ovomucin gel are similar to xanthan gum: viscosity decreased with shear, therefore can be used as thickener and stabilizer instead of xanthan gum (salad dressings, ketchup, soups...).
- Ovomucin gel is heat stable: can be used as a thickener and stabilizer in heat sensitive systems and add to the protein content of the product.

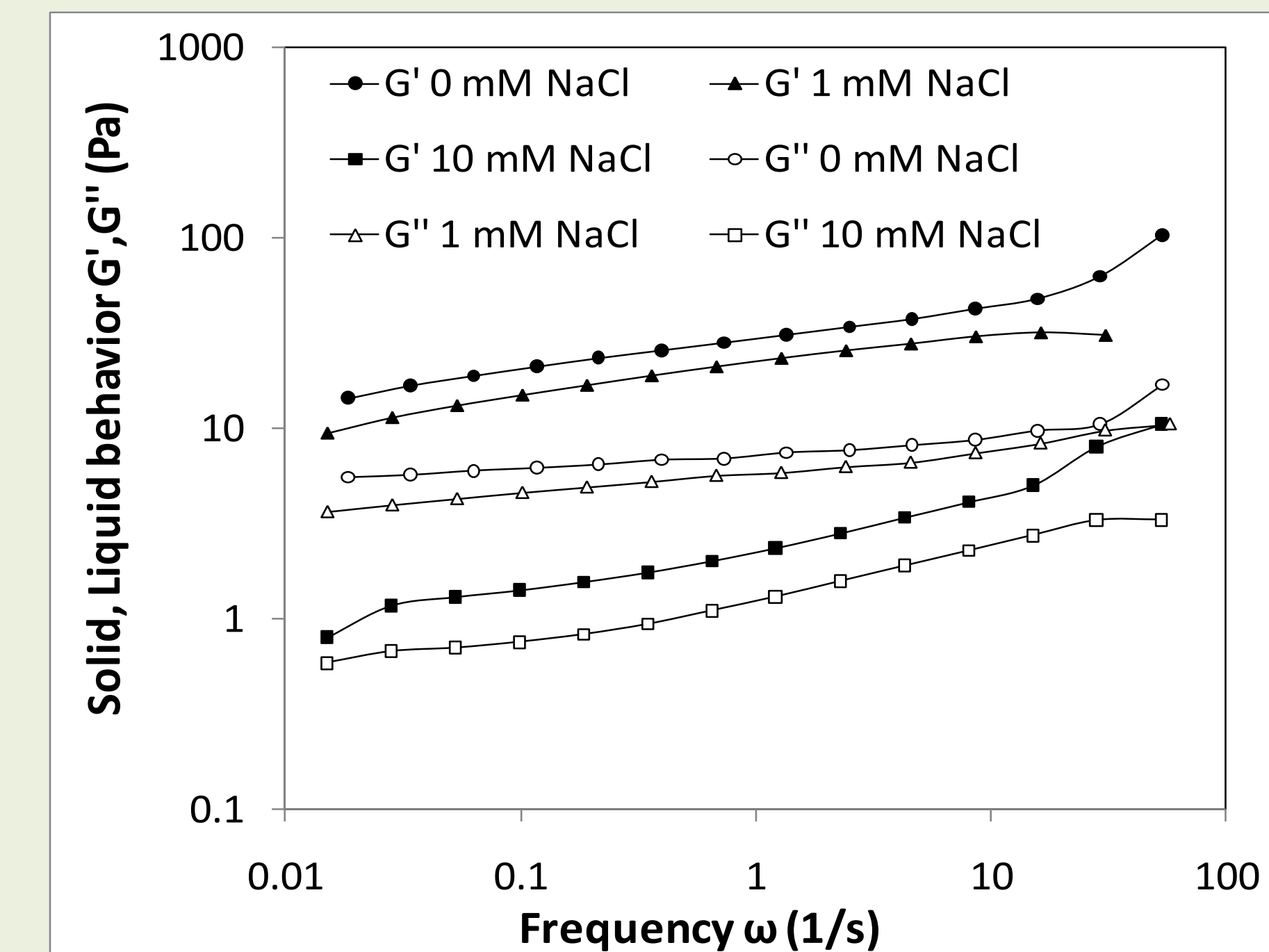
Results



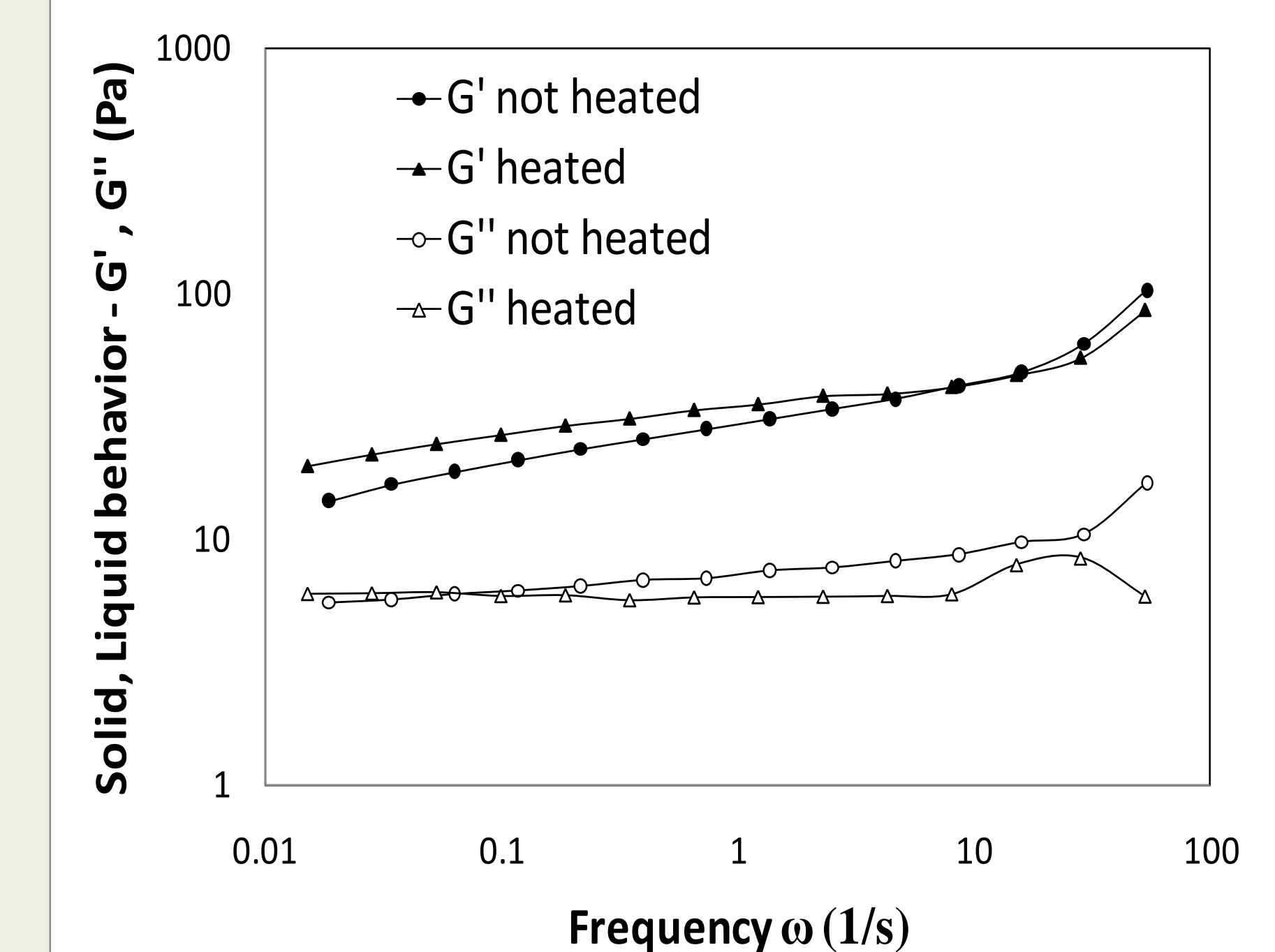
Electron microscopy of gel surface



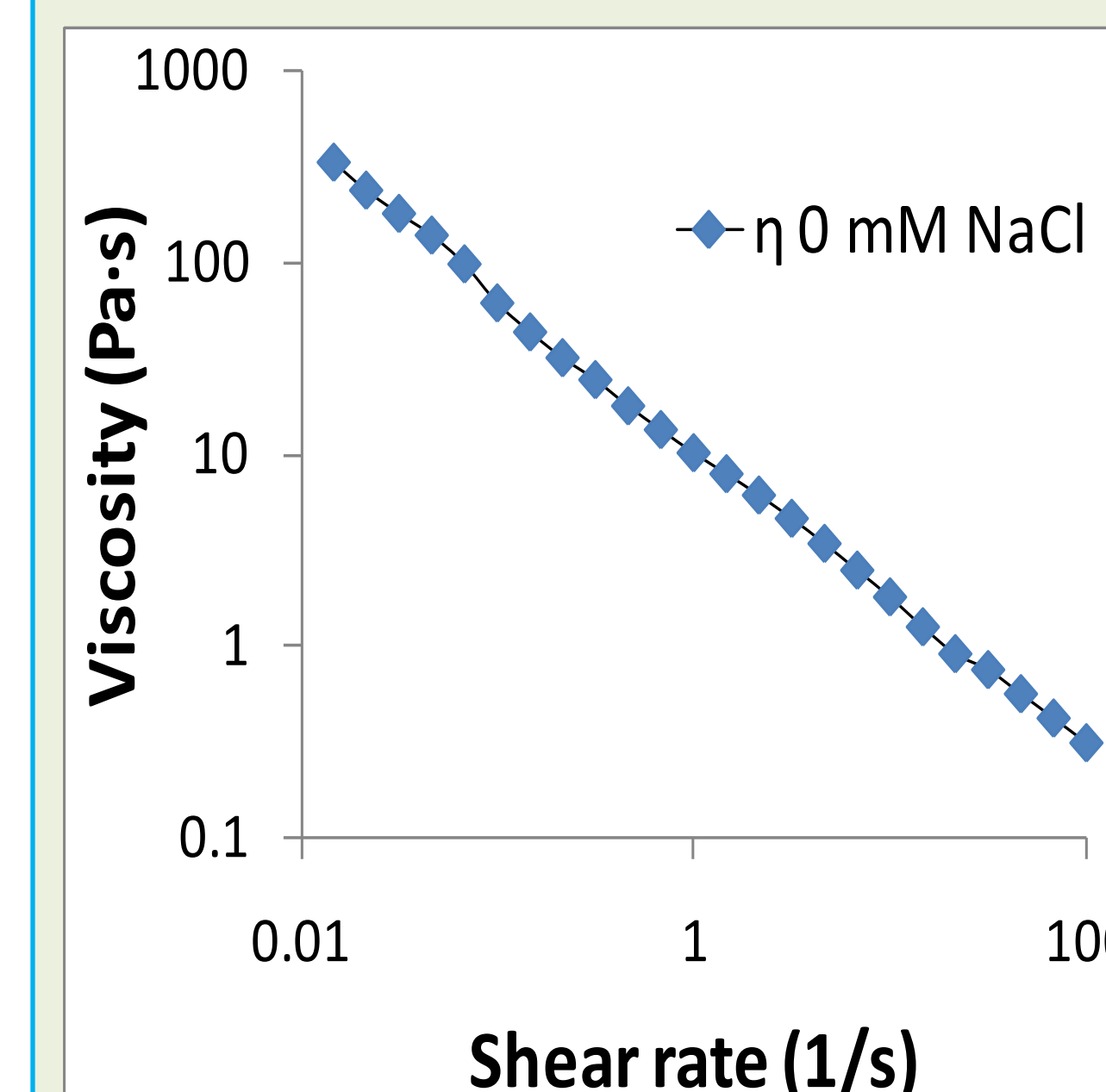
Electron microscopy of gel section



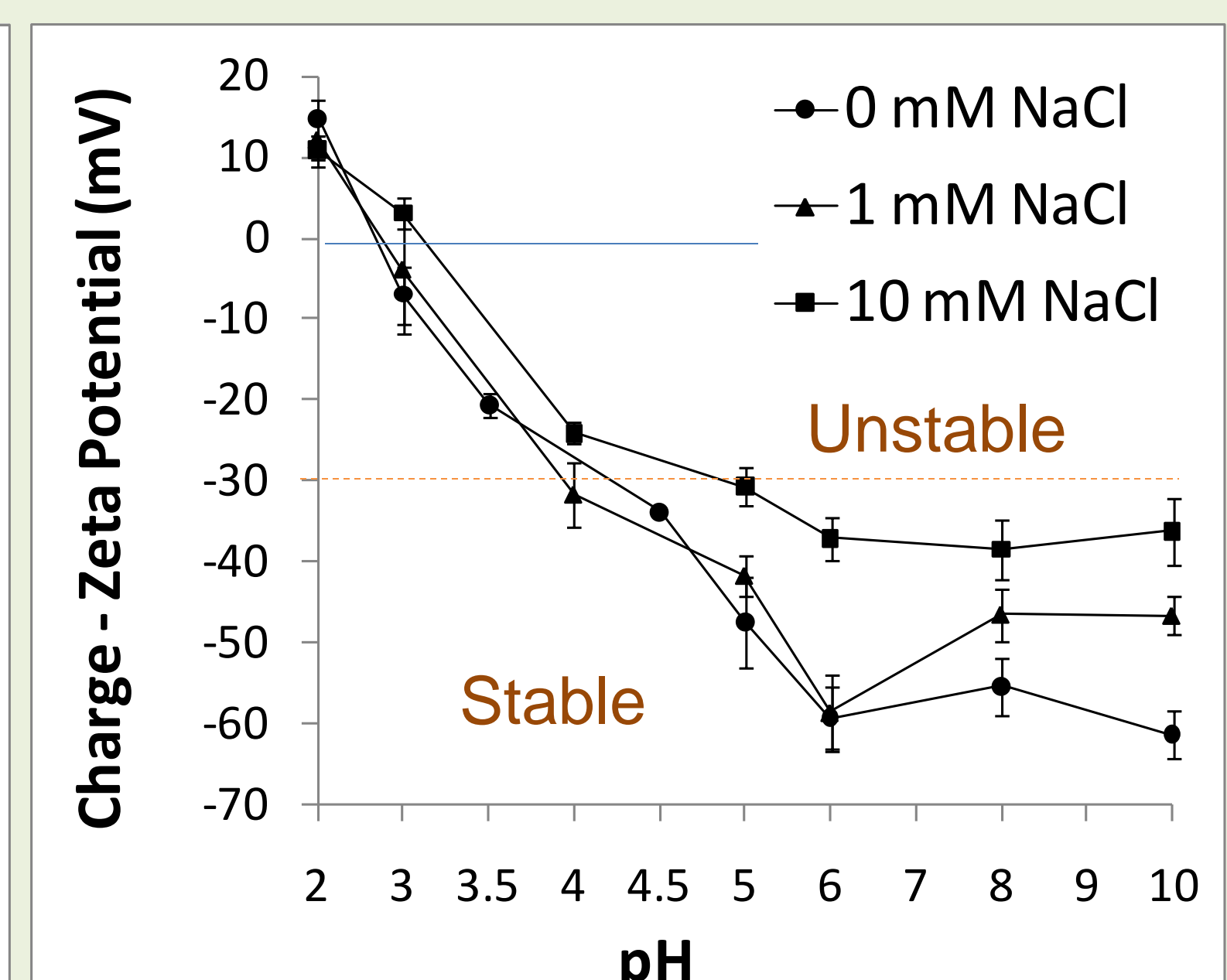
Influence of salt on gel flow



Influence of heating on gel flow



Shear-thinning behavior



Influence of salt on charge

Acknowledgements:

