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SUMMARY of
2017 RESEARCH RESULTS REPORT
For International Collaborative Research with IPR, Osaka University

Research Title		Interplay between functional and pathological amyloids
Applicant	**Name**	OTZEN, Daniel
	Affiliation	iNANO, Aarhus University, Denmark
	Present Title	Professor
Research Collaborator (Host PI)		GOTO, Yuji

Summary

Amyloid, in which proteins self-associate by stacking to form cross-β structure of unlimited length, is often associated with debilitating neurodegenerative diseases like Alzheimer's and Parkinson's. However, it has attracted considerable interest that living organisms are also able to form functional amyloid. The most well-studied examples are provided by the curli system in E. coli (amyloid component CsgA) and the fap system in Pseudomonas (amyloid component FapC). These amyloid structures are evolutionarily optimized to form fibrils and we can therefore expect that their mechanisms of amyloid formation will reveal new facets of controlled protein self-assembly. Key to their success is the existence of multiple imperfect repeats which according to our own studies form β-hairpin structures that are ideal for the formation and propagation of the amyloid fold. Differential scanning calorimetry will be used to study the thermodynamic aspects of these processes, which are far from clear.

Because OTZEN could not come to IPR, we discussed the possible experiments to be performed regarding thermodynamics of amyloid formation of CsgA and FapC. On the other hand, with glucagon samples provided by OTZEN, Goto's laboratory started calorimetry monitoring the spontaneous amyloid formation. In addition, the effects of temperature on the formation and degradation were studied. The results to be performed in future will clarify the thermodynamic mechanism of glucagon.

With other international collaborators, we planned and applied for the JSPS Core-to-Core Program, a program designed to create top world-class research centers, and the proposal has been accepted. The program: "An international cutting-edge network for the study of protein aggregation" will continue for 5 years (2017-2022) and we will advance our collaboration on functional amyloids taking advantage of this program.