別紙

新学術領域研究（研究領域提案型）の研究概要（英語版）

Singularity biology

http://singularity-bio.jp/eng/

Number of Research Area	:	8007	Term of Project :	FY2018-2022
Head Investigator	:	NAGAI, Takeharu		
Research Institution	:	Osaka University, The Institute of Scientific and Industrial Research		

There exist critical moments, such as the Big Bang, where something is created from nothing, or potential moments in the future when artificial intelligence outperforms human intelligence. These moments are called singularities. Singularity events have a major feature where a small number of rare events would become the trigger to cause drastic and irreversible changes (singularity phenomenon) throughout the manybody complex system. Even in life phenomena, it is known that a relatively small number of cells (singularity cell) can become the core to trigger drastic change of the entire multi-cellular system, the mechanisms by which these phenomena occur are largely unknown. In this research area, in order to approach the biological singularity phenomenon, the research team will construct and improve the trans-scale-scope AMATERAS, which is compatible with ultra-wide field of view, high spatial resolution, high speed and long term imaging, so that singularity cells are not overlooked. In addition, two research groups: Group A01 “Development of technologies for measuring and manipulating singularity cells”, and Group A02 “Development of mathematical and information technologies for analyzing singularity phenomena" are organized, and the technologies developed are fed back to AMATERAS as needed. Moreover, Group A03 “Elucidation of the biological significance of singularity phenomena" is also organized to promote highly interactive collaborative research in measurement science, mathematical and information science, and biology. We expect research proposals that will supplement and contribute to the elucidation of various biological singularity phenomena, and promote highly-interdisciplinary joint research with us by using AMATERAS.

Research Group	Upper Limit of Annual Budget (Million yen)	Number of research projects scheduled to be selected
A01 Development of technologies to measure and control singularity cells	4 2.5	5 22
A02 Development of mathematical and information technologies to analyze singularity phenomena		
A03 Elucidation of the biological significance of singularity phenomena		