Development of LIBS for future lunar and planetary exploration at PERC/Chitech, the University of Tokyo, and RISE/NAOJ

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We introduce development of laser-induced breakdown spectrometer (LIBS) at *Planetary Exploration Research Center* of *Chiba Institute of Technology* (**PERC/Chitech**) as a joint program among PERC/Chitech, the University of Tokyo, and RISE project of National Astronomical Observatory, JAPAN. LIBS is a spectroscopic elemental analyzer of laser-plume which has advantages in (a) short time period of measurement, (b) no need for radioactive elements, (c) high spatial resolution, (d) remote sensing within about 10 m, (e) variety of measurable elements, and (f) great ability in penetration. Application of LIBS to future planetary exploration such as Mars landing mission, SELENE 3, and sample return from near asteroid is highly expected.

For Japanese Mars landing mission which is currently in planning phase, LIBS is proposed as a candidate of onboard instrument that can detect (1) major elemental abundances of surface rocks, (2) organic materials, (3) rare earth elements, and, in particular, (4) K abundance for K-Ar age determination. LIBS is a unique instrument that can apply for not only solid materials, but also liquids, therefore could become an inevitable instrument for future lunar and planetary missions. We plan to start a new center for planetary explorations from this joint program among three institutions.